EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez

EHR AC Chair

Chancellor
L.A. Community College District

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DIRECTORATE FOR
EDUCATION & HUMAN RESOURCES

New EHR Advisory Committee Member

Kaye Husbands Fealing
Professor and Chair Georgia Institute of Technology

National Science Foundation

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Departing
EHR Advisory Committee Members

Roy Pea
David Jacks Professor of Education and
Learning Sciences, Stanford University

Bruce Alberts
Editor-in-Chief, *Science*
San Francisco, California

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DIRECTORATE FOR
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Departing
EHR Acting Assistant Director

Jim Lewis
Expert, EHR

National Science Foundation

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DIRECTORATE FOR
EDUCATION & HUMAN RESOURCES

New
EHR Assistant Director

Karen Marrongelle

National Science Foundation

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National Academy of Education Spencer Dissertation Fellowship Program

James Spillane

National Science Foundation

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DIRECTORATE FOR EDUCATION & HUMAN RESOURCES

Simmons College

Vice President, Organization Culture, Inclusion and Equity

Debra Joy Pérez

National Science Foundation

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NSF-Wide and EHR Public-Private Partnerships

Moderator: Evan Heit

Director of the EHR Division of Research on Learning in Formal and Informal Settings (DRL)

National Science Foundation

NSF's Public-Private Partnership Activities

Ken Calvert
Division Director, CISE/CNS
Co-lead, Partnerships Agency Priority Goal Implementation Team
Co-lead, Partnerships Goal Team, Renewing NSF

Partnerships: Component of NSF Strategy

- Partnerships Agency Priority Goal
- A focus area in Renewing NSF

Performance.gov

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National Science Foundation

Agency Priority Goals

Expand Public and Private Partnerships

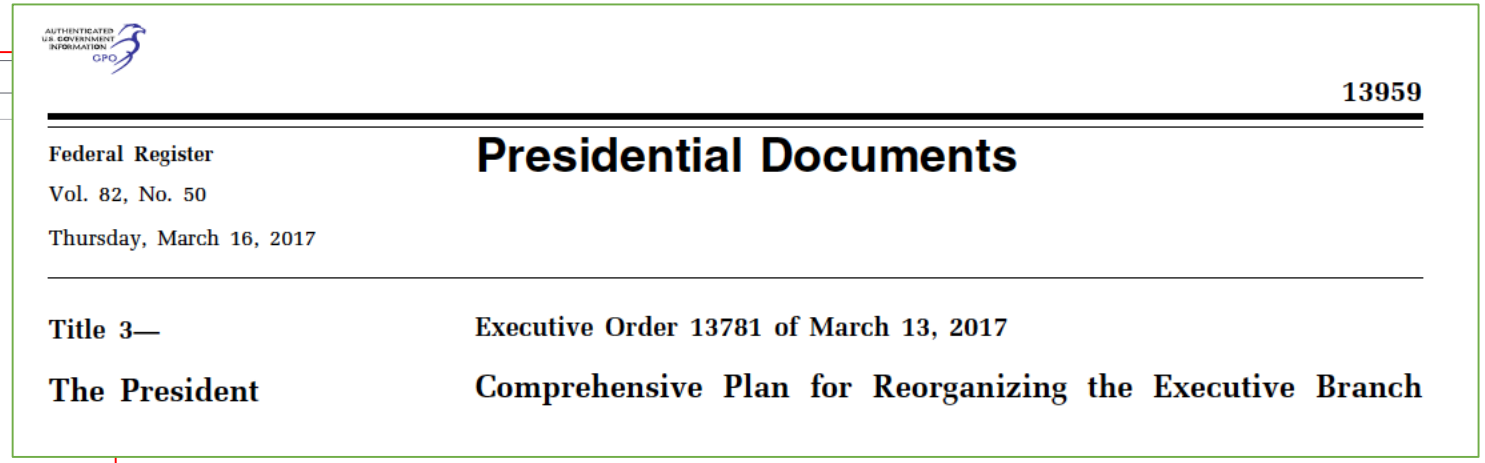
National Science Foundation

Expand Public and Private Partnerships

Goal Leaders: James Deshler, Deputy Division Director, Division of Biological Infrastructure (DBI), Directorate for Biological Sciences

Kenneth L. Calvert, Division Director, Division of Computer and Network Systems (CNS), Directorate of Computer Information Science and Engineering

Goal Statement: Expand public and private partnerships to enhance the impact of NSF's investments and contribute to American economic competitiveness and security. By September 30, 2019, NSF's number of partnerships and/or award actions with other federal agencies, private industry, and foundations/philanthropies will grow by 5 percent, relative to the FY 2017 baseline, to make available infrastructure, expertise, and financial resources to the US scientific and engineering research and education enterprise.



13959

Federal Register
Vol. 82, No. 50
Thursday, March 16, 2017

Presidential Documents

Title 3—
The President

Executive Order 13781 of March 13, 2017

Comprehensive Plan for Reorganizing the Executive Branch

Background: Agency Priority Goals

- Every Federal Agency regularly establishes performance goals
  - In consultation with the Office of Management and Budget (OMB)
  - Some are designated as Agency Priority Goals (APGs)
- For FY18-19, NSF has one Priority Goal (established Fall 2017):

  Expand public and private partnerships to enhance the impact of NSF's investments and contribute to American economic competitiveness and security.

  By September 30, 2019, NSF's number of partnerships and/or award actions with other federal agencies, private industry, and foundations/philanthropies will grow by 5 percent, relative to the FY 2017 baseline, to make available infrastructure, expertise, and financial resources to the US scientific and engineering research and education enterprise.

APG Structure and Overall Strategy

NSF will pursue the APG by implementing a strategic vision for future partnerships that builds upon existing and emerging experience. NSF will enhance and expand its investments along three axes:

- research and innovation;
- research infrastructure; and
- workforce development.

Along each axis, NSF will pursue a staged strategy aligned with its mission. The stages of this process include:

1. Strategically identify opportunities with potential partners (e.g., workshops, meetings, other outreach).
2. Work externally as well as internally to efficiently formalize partnerships (e.g., formulate and sign MOUs, streamline MOU processes internally).
3. Implement partnerships (e.g., issue new or updated funding opportunities, make awards, execute agreements).

Partnerships APG Working Group

- Step 1: Determine scope of the 5% target
  - Define "Partnerships and/or award actions" to be included

    Activities with at least one domestic partner, where:

    Formal agreement existed AND funds flowed in FY17

    OR

    Formal agreement was created in FY17
- Step 2: Inventory partnerships across NSF to establish baseline

PARTNERSHIP ACTIVITIES	2017	2018	2019
Interagency	42		
Private	7		
Nonprofit/ Foundation	3		
TOTAL	52		

Renewing NSF

From the FY19 Budget Request to Congress:

> "As part of its Agency Reform Plan, NSF will initiate operational reforms in four areas in FY 2019: (1) make information technology work for us, (2) align NSF's workforce and work, (3) expand public and private partnerships, and (4) streamline, standardize, and simplify programs and processes."

"Renewing NSF" is the Agency's response to Executive Order 13781 (March 2017)

Renewing NSF: Implementation strategy

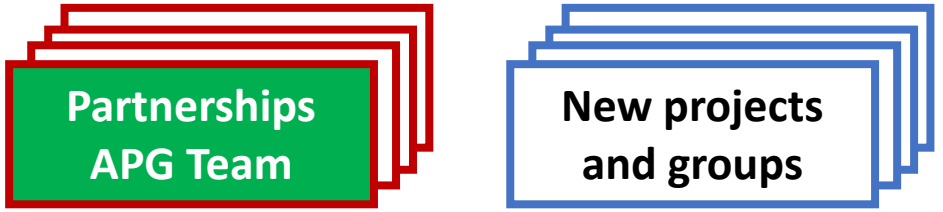
1. Steering Group: Strategic Leadership and Vision, Integration, and Governance

Leadership | Communications | Agency Engagement | Budget | Evaluation & Performance

2. Goal Teams: Goal Accountability and Implementation

- Making IT work for us — *Proposal Submission Modernization*
- Adapting NSF's work and workforce — *Maximizing Employee Performance*
- Streamlining, standardizing, and simplifying programs and processes — *Merit Review Process*
- Expanding and deepening public-private partnerships — *Partnerships Agency Priority Goal*

3. Implementation Teams: Project-Level Execution



Partnerships Goal Team

- Formed June 2018
- Initial SWOT analysis
- Development of Vision for NSF's Partnerships
  - Key Elements
  - Challenges/Opportunities
  - Bold Steps

Partnerships Goal Team

- Key Elements
  - Global leadership in impact catalyzed by partnerships
  - Guided by unified strategic vision
  - Streamlined, flexible mechanisms
  - Systematic, continual assessment of success metrics
- Example Challenges
  - Operating within Federal context/constraints
  - Overburdened workforce
- Example Opportunities
  - NSF's "Gold Standard" merit review process
  - Administration interest in public-private partnerships
- Example Bold Steps
  - Develop framework/method for identifying advantageous partnerships
  - Build a partnerships toolbox

Partnerships APG Current Activity

- Collecting "Best Practices" from across the foundation
- Developing "MoU Tool" to help streamline approval process

Partnership Examples from Baseline

- CyberCorps™ Scholarships for Service (NSF 17-556)
  - Lead Directorate: EHR
  - Partners: DHS, OPM, NSA
- IDEAS Lab on the Physics of Cancer
  - Lead Directorate: MPS
  - Partner: Stand Up 2 Cancer
- Software-Defined Infrastructure as a Foundation for Clean-Slate Computing Security (NSF 16-582)
  - Lead Directorate: CISE
  - Partner: VMware

Partnerships APG Implementation Team

Ken Calvert, Jim Deshler, Meghan Houghton, Tara Bracken, Clark Cooper, Teresa Davis, Darren Dutterer, Anne Emig, Jean Feldman, Soo-Siang Lim, Leah Nichols, Karen Santoro, Lee Zia

Also: Amber Baum

Renewing NSF Goal Team

Ken Calvert, Barry Johnson, Carl Anderson, Erin Dawson, Anne Doyle, Theresa Good, Tony DiGiovanni

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EHR PPP Activities

Sarah-Kay McDonald
Senior Advisor, EHR office of the Assistant Director

National Science Foundation

EHR Public-Private Partnership Activities

Session 1, EHR AC meeting — Thursday October 18, 2018

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Partners' roles in accomplishing EHR goals

- Partners provide **perspectives & expertise**. Drawing on these resources, partners' advice helps:
  - Identify (emerging) challenges
  - Establish priorities, set agendas
  - Model approaches, develop strategies
- Partners can provide **other resources** *e.g.,*
  - Internships & other training opportunities
  - Access to subject matter experts
  - Data, tools
  - Funds
- Partners can engage in **synergistic activities**.

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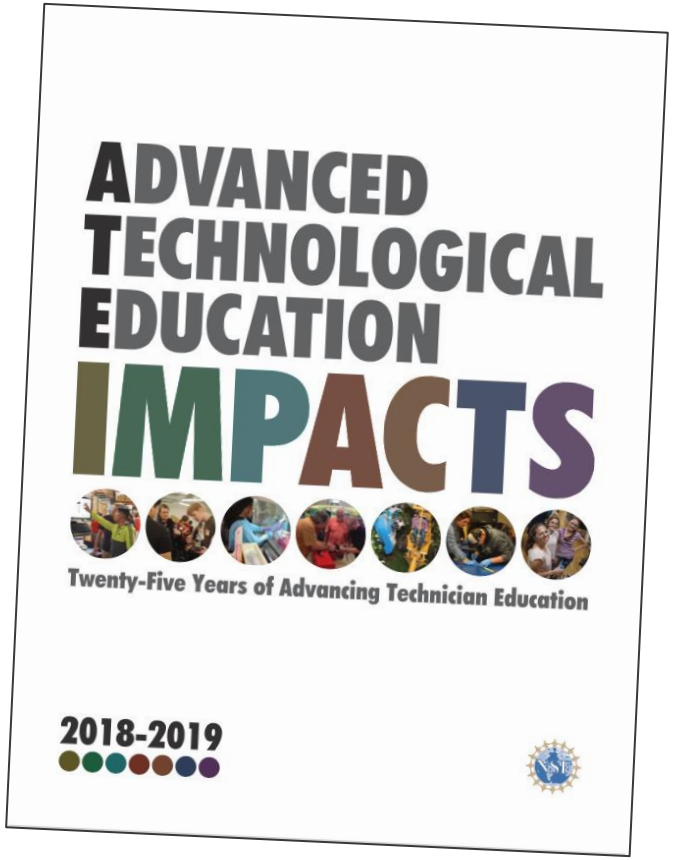
EHR: Catalyzing & supporting partnerships

Advanced Technological Education (ATE)

- Involves partnerships between academic institutions (grades 7-12, IHEs) & industry to promote improvement in the education of science and engineering technicians at the undergraduate and secondary institution school levels.
- Encourages partnerships with other entities that may impact technician education (e.g., NIST, Manufacturing USA Institutes, IMCPs).



Source: https://atecentral.net/downloads/3916/ATE_Impacts_2018-2019.pdf

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Leveraging resources to accelerate innovation

- ***Graduate Research Internship Program*** (GRIP)
- ***Graduate Research Opportunities Worldwide*** (GROW)
- ***National Science Foundation Research Traineeship*** (NRT)
- ***CyberCorps® Scholarship for Service*** (SFS)
- ***Non-Academic Research Internships for Graduate Students*** (INTERN)

Providing STEM workforce development opportunities

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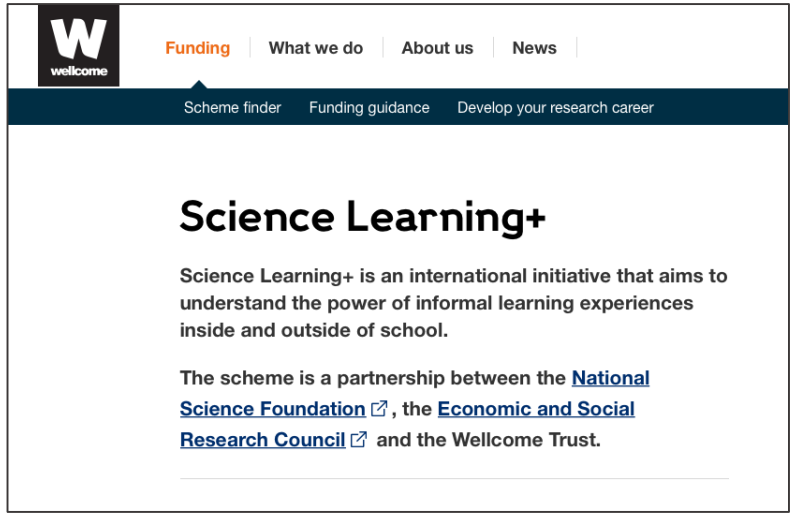
Leveraging resources to accelerate innovation

Science Learning+ Partnership Grants (AISL)

- International partnership between NSF and the Wellcome Trust with the UK Economic & Social Research Council (ESRC).
- Required collaborations between at least one organization in the U.S. and one in the UK/Republic of Ireland.
- Designed to increase partnerships, understanding, and influence between STEM education/learning researchers and practitioners, and to develop collaborations among institutions & individuals engaged in informal STEM experiences.



Source: https://wellcome.ac.uk/funding/science-learning

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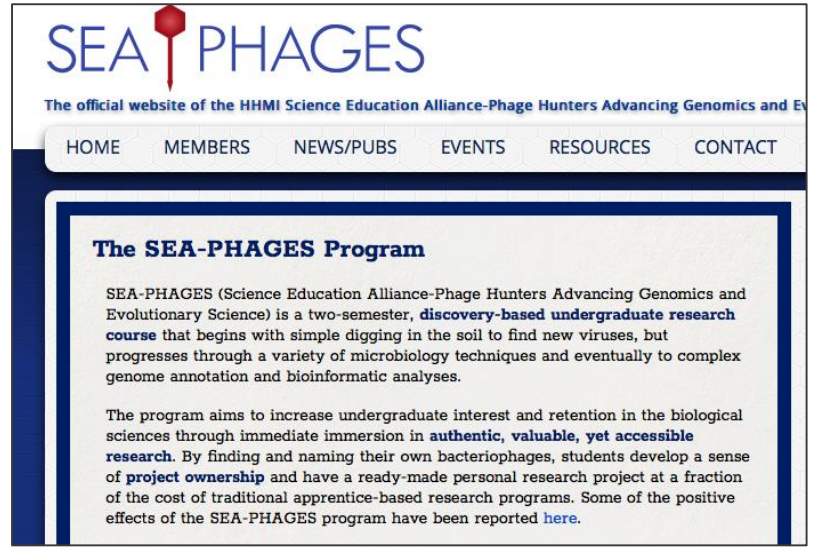
Leveraging resources to accelerate innovation

Science Education Alliance Phage Hungers Advancing Genomics & Evolutionary Science in Tribal Colleges & Universities (SEA-PHAGES in TCUs)



Source: https://seaphages.org

- Novel partnership with the Howard Hughes Medical Institute.
- TCUs apply to the HHMI Science Education Alliance.
- HHMI provides the support to TCUs it provides to all SEA institutions.
- NSF's Tribal Colleges and Universities Program (TCUP) accepts proposals to enable participation in the SEA-PHAGE program.

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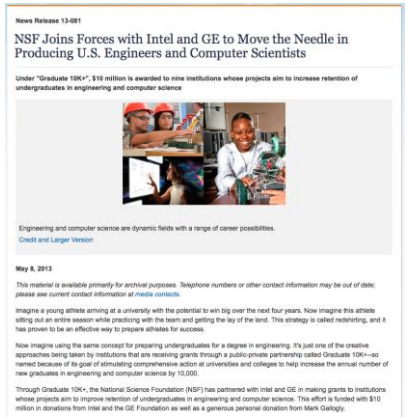
Leveraging resources to accelerate innovation

Graduate 10K+ (STEP special funding focus)



News Release 13-081

NSF Joins Forces with Intel and GE to Move the Needle in Producing U.S. Engineers and Computer Scientists

Under "Graduate 10K+", $10 million is awarded to nine institutions whose projects aim to increase retention of undergraduates in engineering and computer science

Engineering and computer science are dynamic fields with a range of career possibilities.

Credit and Larger Version

May 8, 2013

This material is available primarily for archival purposes. Telephone numbers or other contact information may be out of date; please see current contact information at media contacts.

Imagine a young athlete arriving at a university with the potential to win big over the next four years. Now imagine this athlete sitting out an entire season while practicing with the team and getting the lay of the land. This strategy is called redshirting, and it has proven to be an effective way to prepare athletes for success.

Now imagine using the same concept for preparing undergraduates for a degree in engineering. It's just one of the creative approaches being taken by institutions that are receiving grants through a public-private partnership called Graduate 10K+—so named because of its goal of stimulating comprehensive action at universities and colleges to help increase the annual number of new graduates in engineering and computer science by 10,000.

Through Graduate 10K+, the National Science Foundation (NSF) has partnered with Intel and GE in making grants to institutions whose projects aim to improve retention of undergraduates in engineering and computer science. This effort is funded with $10 million in donations from Intel and the GE Foundation as well as a generous personal donation from Mark Gallogly.

Source: https://www.nsf.gov/news/news_summ.jsp?cntn_id=127902

- Cooperative activity between NSF and members of the President's Jobs Council's High Tech Education working group.
- Funded with $10 million in donations from Intel and the GE Foundation, & a generous personal donation.
  - A 2013 Graduate 10K+ award established the Washington STate Academic RedShirt program in engineering (STARS) to help level the playing field for engineering students.
  - Building on the success of the "Washington STARS" model, in 2016 the NSF Scholarships for STEM (S-STEM) program supported the Redshirt in Engineering Consortium.
  - Last month Amazon announced $1 million in additional funding for consortium member University of Illinois.

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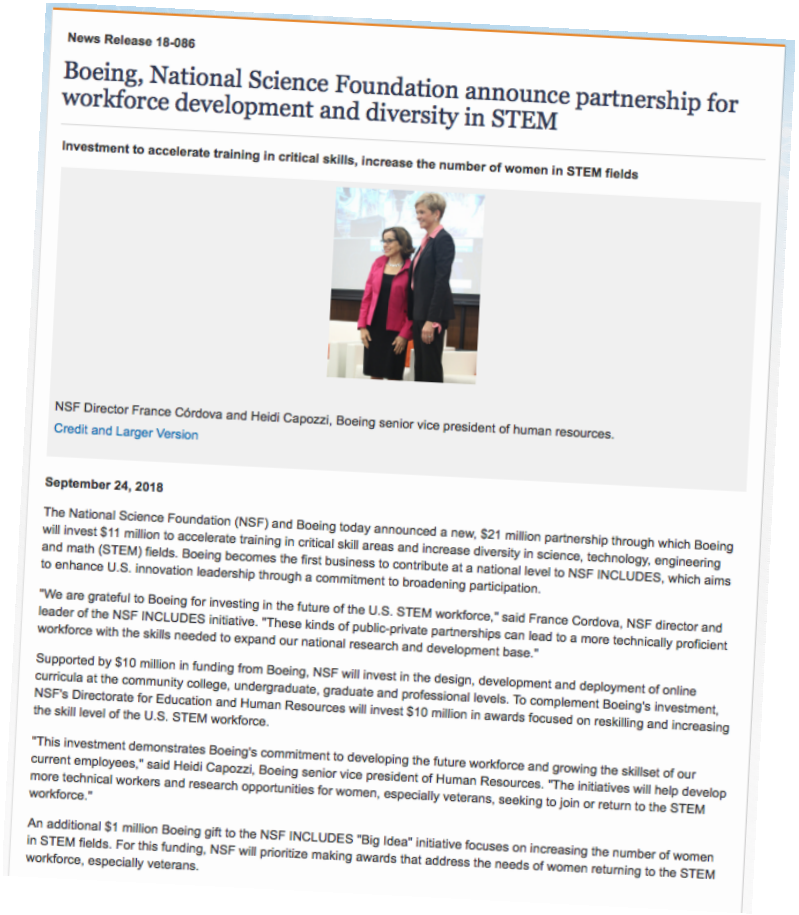
Leveraging resources to accelerate innovation

Last month, NSF & Boeing announced a new partnership to accelerate training in critical skill areas & increase diversity in STEM fields.

- Supported by $10 million in funding from Boeing, NSF will invest in the design, development, & deployment of online curricula at the community college, undergraduate, graduate, and professional levels.
- To complement Boeing's investment, EHR will invest $10 million for research focused on reskilling & increasing the technical abilities of the U.S. STEM workforce.
- An additional $1 million Boeing gift to NSF INCLUDES focuses on increasing the number of women in STEM fields.



News Release 18-086

Boeing, National Science Foundation announce partnership for workforce development and diversity in STEM

Investment to accelerate training in critical skills, increase the number of women in STEM fields

NSF Director France Córdova and Heidi Capozzi, Boeing senior vice president of human resources.
Credit and Larger Version

September 24, 2018

The National Science Foundation (NSF) and Boeing today announced a new, $21 million partnership through which Boeing will invest $11 million to accelerate training in critical skill areas and increase diversity in science, technology, engineering and math (STEM) fields. Boeing becomes the first business to contribute at a national level to NSF INCLUDES, which aims to enhance U.S. innovation leadership through a commitment to broadening participation.

"We are grateful to Boeing for investing in the future of the U.S. STEM workforce," said France Cordova, NSF director and leader of the NSF INCLUDES initiative. "These kinds of public-private partnerships can lead to a more technically proficient workforce with the skills needed to expand our national research and development base."

Supported by $10 million in funding from Boeing, NSF will invest in the design, development and deployment of online curricula at the community college, undergraduate, graduate and professional levels. To complement Boeing's investment, NSF's Directorate for Education and Human Resources will invest $10 million in awards focused on reskilling and increasing the skill level of the U.S. STEM workforce.

"This investment demonstrates Boeing's commitment to developing the future workforce and growing the skillset of our current employees," said Heidi Capozzi, Boeing senior vice president of Human Resources. "The initiatives will help develop more technical workers and research opportunities for women, especially veterans, seeking to join or return to the STEM workforce."

An additional $1 million Boeing gift to the NSF INCLUDES "Big Idea" initiative focuses on increasing the number of women in STEM fields. For this funding, NSF will prioritize making awards that address the needs of women returning to the STEM workforce, especially veterans.

Source: https://www.nsf.gov/news/news_summ.jsp?cntn_id=296700

EHR Public-Private Partnership Activities

Strategies and opportunities for the future

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NSF INCLUDES and PPP

Sylvia James

Acting Deputy Assistant Director, EHR

Monya Ruffin-Nash

Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL)

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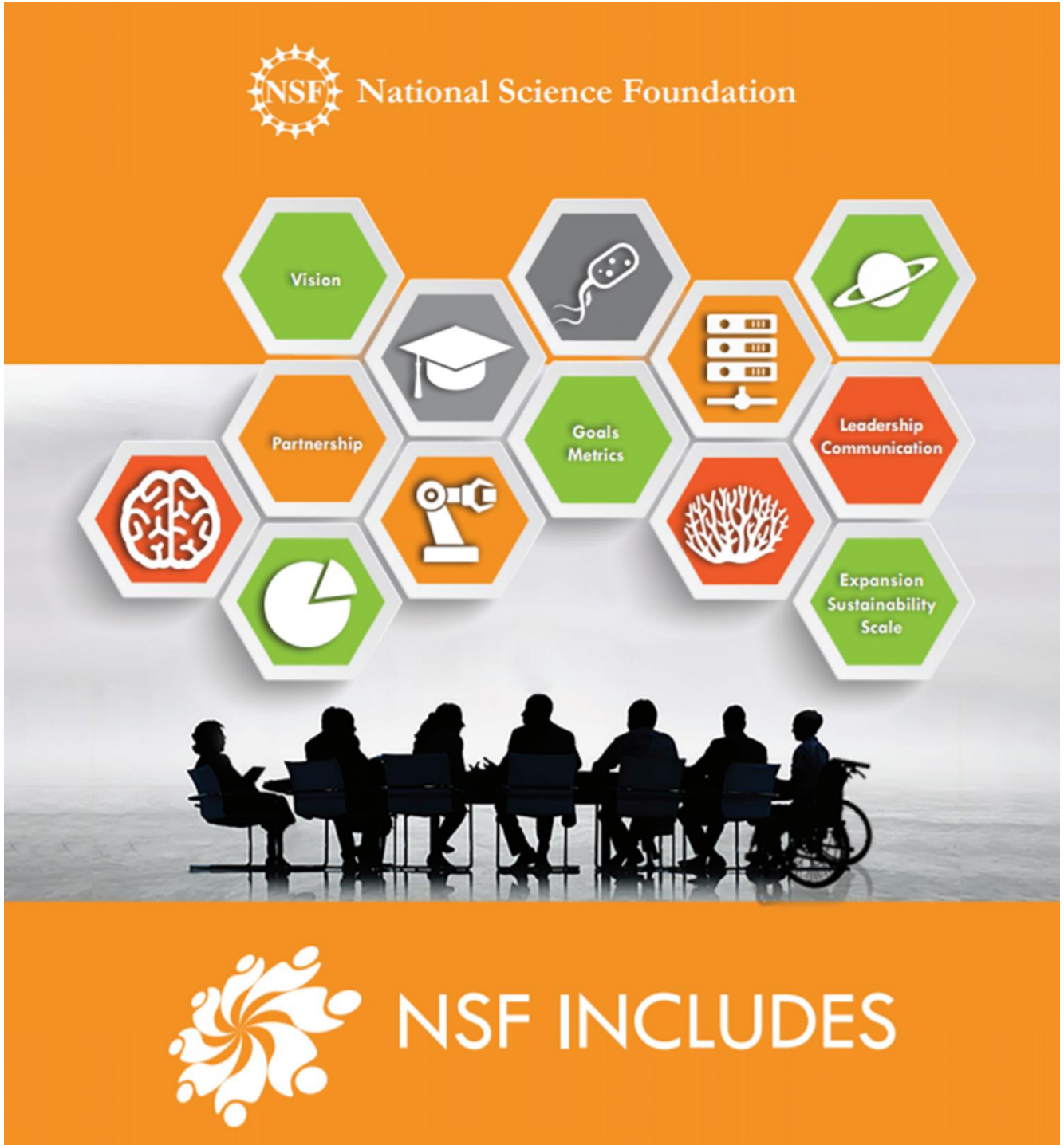
NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science



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NSF INCLUDES MOU with Boeing

- Boeing is the first corporation to contribute to NSF INCLUDES nationally
- The Boeing $1 million gift will be used to target women, especially women veterans, returning to the STEM workforce
- A Dear Colleague Letter will be released in fall 2018

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Funders Collaborative Meeting

October 25-26, 2018

GOAL: To identify existing mechanisms and generate innovative new ways that funding agencies can collaborate through **interagency and public-private partnerships** that advance broadening participation goals in federal STEM education including through the NSF INCLUDES National Network.

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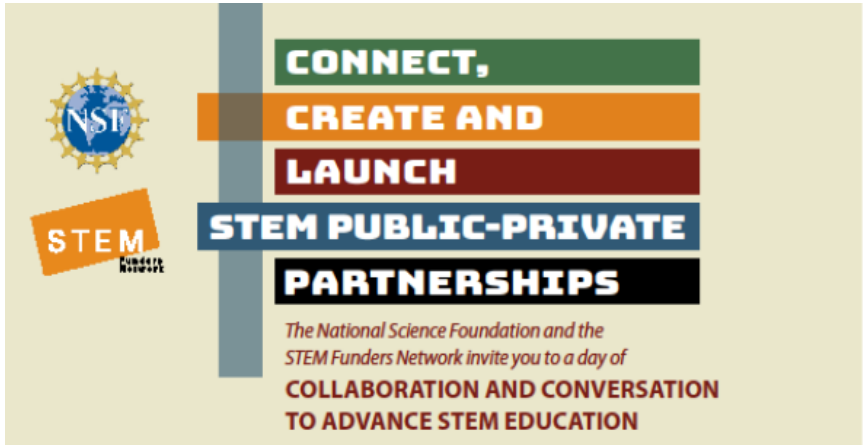
Funders Collaborative Meeting

October 25-26, 2018

Day 1 for Federal agencies: 18 Federal agencies & NSF INCLUDES teams, interested staff

Day 2 for Federal agencies, STEM funders, and guests: STEM Funders Network Executive Committee, member organizations and 30 organizations such as foundations, community-based organizations, academic institutions, and informal science education institutions



Co-hosted by NSF INCLUDES & the STEM Funders Network

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Discussion questions

- How might EHR's participation in PPP expand support of STEM education research and development?
- How might PPP serve NSF INCLUDES in building a national network for funders dedicated to collective impact around broadening participation and institutional capacity? What does it mean to be a part of a national network?
- How might PPP support the integration of STEM education R&D and STEM research?
- Are there questions or comments about this session that you'd like to discuss with NSF leadership?

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Morning Break

10:30 – 10:45AM

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STEM Workforce Development

Moderator: Lee Zia

Deputy Director, EHR Division of Undergraduate Education (DUE)

National Science Foundation

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Background

- EHR supports Workforce Development throughout all of its divisions
- Training and research: NSB and White House efforts to strengthen the STEM workforce.
- From the future of work to the work of the future

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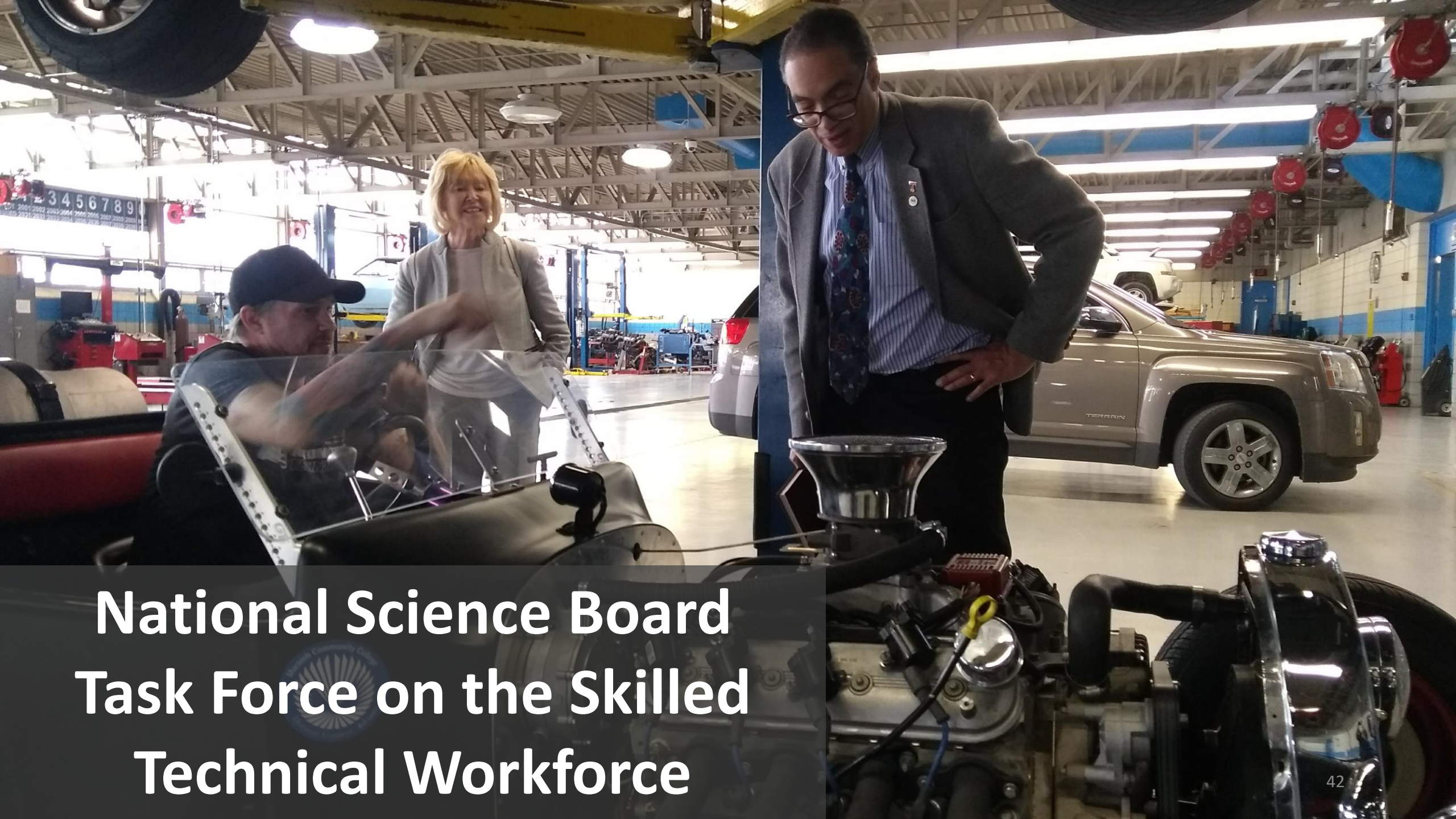
National Science Board (NSB) Task Force on the Skilled Technical Workforce

Matt Wilson

NSB Policy Director (Acting)/Science & Engineering Policy Analyst

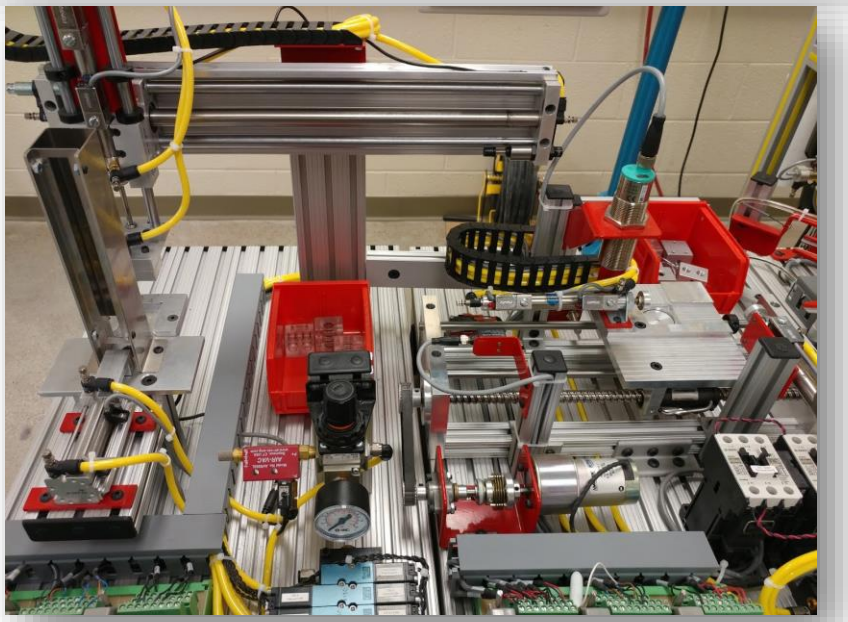
National Science Foundation



National Science Board Task Force on the Skilled Technical Workforce

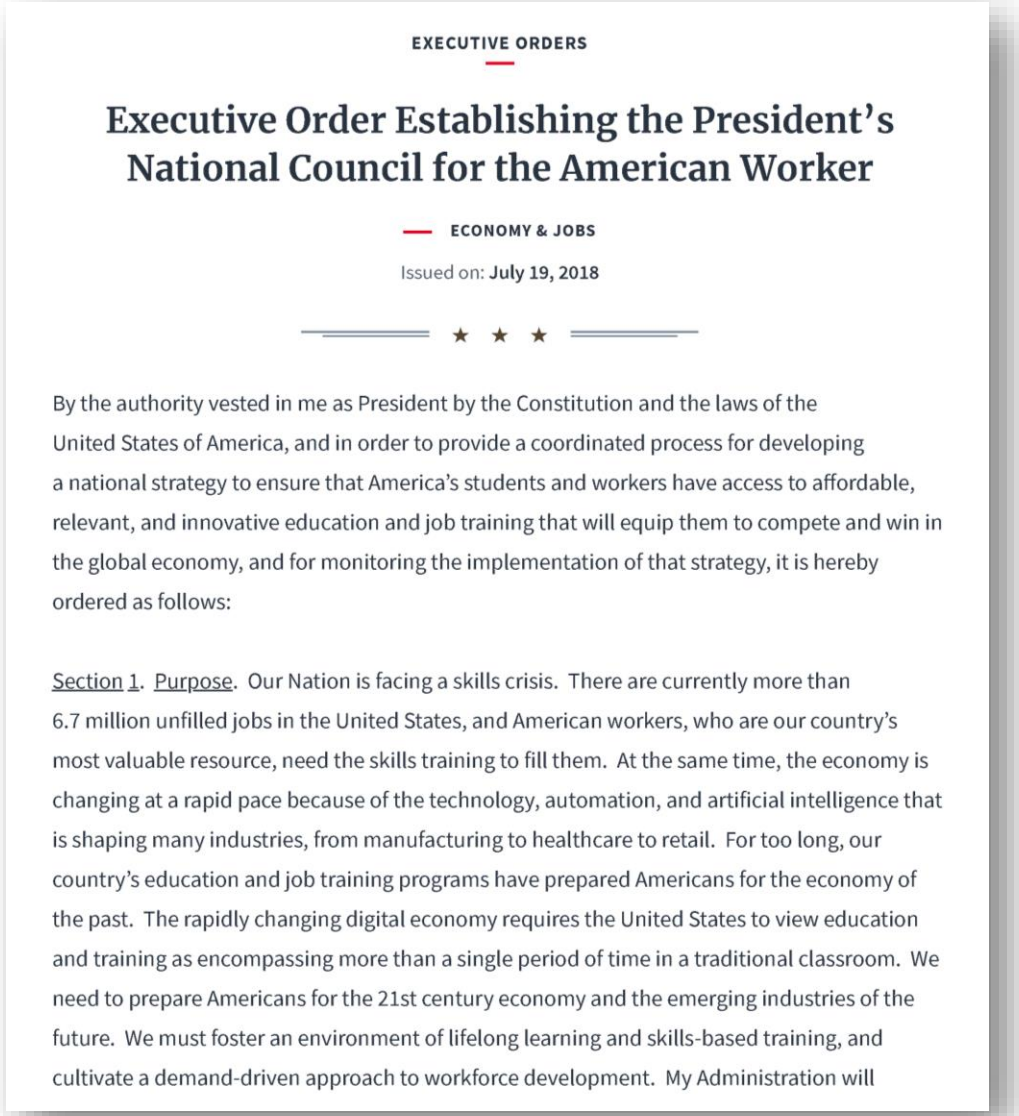
The STW and the U.S. Economy

- The STW is a large, diverse, and growing segment of the STEM workforce.
- Mirrors U.S. population demographics: 13% black, 10% were Hispanic, 4% were Asian, and approximately 11% were foreign born (2015).
- In 2015, STW median earnings in S&E ($60,00) or S&E related ($45,00) occupations higher than median earnings in other occupations ($29,000).
- Many occupations with large numbers of skilled technical workers—such as occupations in information technology and health care sectors are among the fastest growing.
- Skilled technical workers are highly sought after, employers in 80% of local areas said they had trouble filling jobs in occupations that depend on these workers.



White House Priority: STEM Education and the American Worker

- Executive Order Establishing the National Council for the American Worker issued on July 19, 2018.
  - NSF Director one of the 10 Council members.
- The council shall develop recommendations for:
  - A national strategy on cross-sector collaboration to promote workforce development and provide affordable education and skills-based training.
  - Work with agencies to foster consistency in implementing policies and actions developed under this order.
- Initial Tasks (within 180 days)
  - Develop a national campaign to raise awareness of skills crisis, and STEM education.
  - Plan to recognize companies that demonstrate excellence in workplace education, training, and retraining;
  - Examine how Congress and the executive branch can work with other sectors…



EXECUTIVE ORDERS

Executive Order Establishing the President's National Council for the American Worker

ECONOMY & JOBS

Issued on: **July 19, 2018**

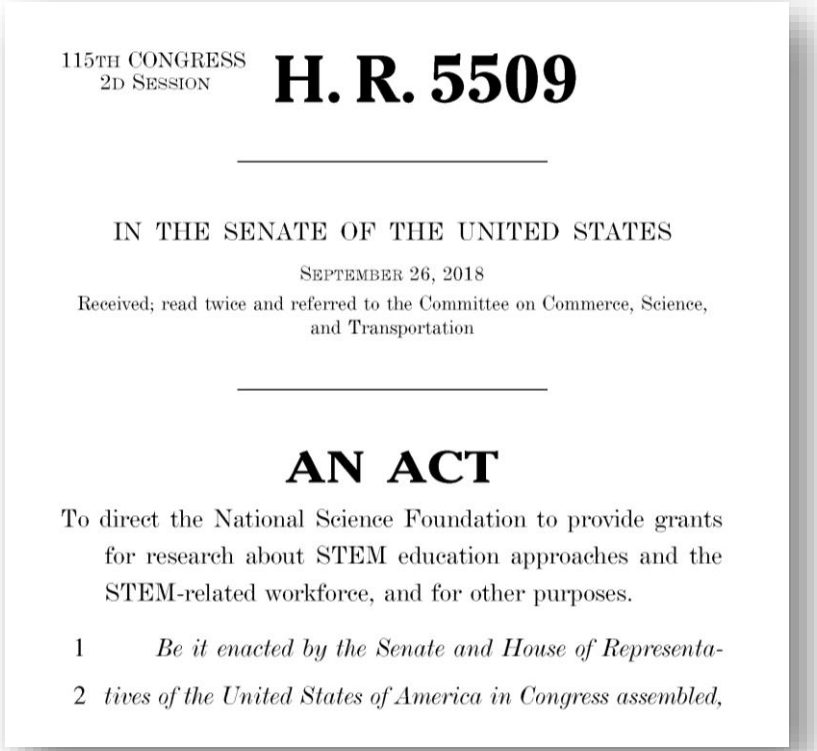
★ ★ ★

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to provide a coordinated process for developing a national strategy to ensure that America's students and workers have access to affordable, relevant, and innovative education and job training that will equip them to compete and win in the global economy, and for monitoring the implementation of that strategy, it is hereby ordered as follows:

Section 1. Purpose. Our Nation is facing a skills crisis. There are currently more than 6.7 million unfilled jobs in the United States, and American workers, who are our country's most valuable resource, need the skills training to fill them. At the same time, the economy is changing at a rapid pace because of the technology, automation, and artificial intelligence that is shaping many industries, from manufacturing to healthcare to retail. For too long, our country's education and job training programs have prepared Americans for the economy of the past. The rapidly changing digital economy requires the United States to view education and training as encompassing more than a single period of time in a traditional classroom. We need to prepare Americans for the 21st century economy and the emerging industries of the future. We must foster an environment of lifelong learning and skills-based training, and cultivate a demand-driven approach to workforce development. My Administration will

Innovations in Mentoring, Training, and Apprenticeships Act

- Bi-partisan bill passed the House on September 26, 2018.
- Directs NSF to
  - Coordinate with other relevant federal agencies to avoid duplication, and enhance the effectiveness
  - Grants for associate degree programs in STEM fields in in-demand industry sector or occupation
  - Support research on post-secondary courses…improve high-school level career and technical education…broaden participation…
  - Additional research shall be conducted on the efficiency of skilled technical labor markets (including survey by NCSES).



115TH CONGRESS
2D SESSION

H. R. 5509

IN THE SENATE OF THE UNITED STATES

SEPTEMBER 26, 2018

Received; read twice and referred to the Committee on Commerce, Science, and Transportation

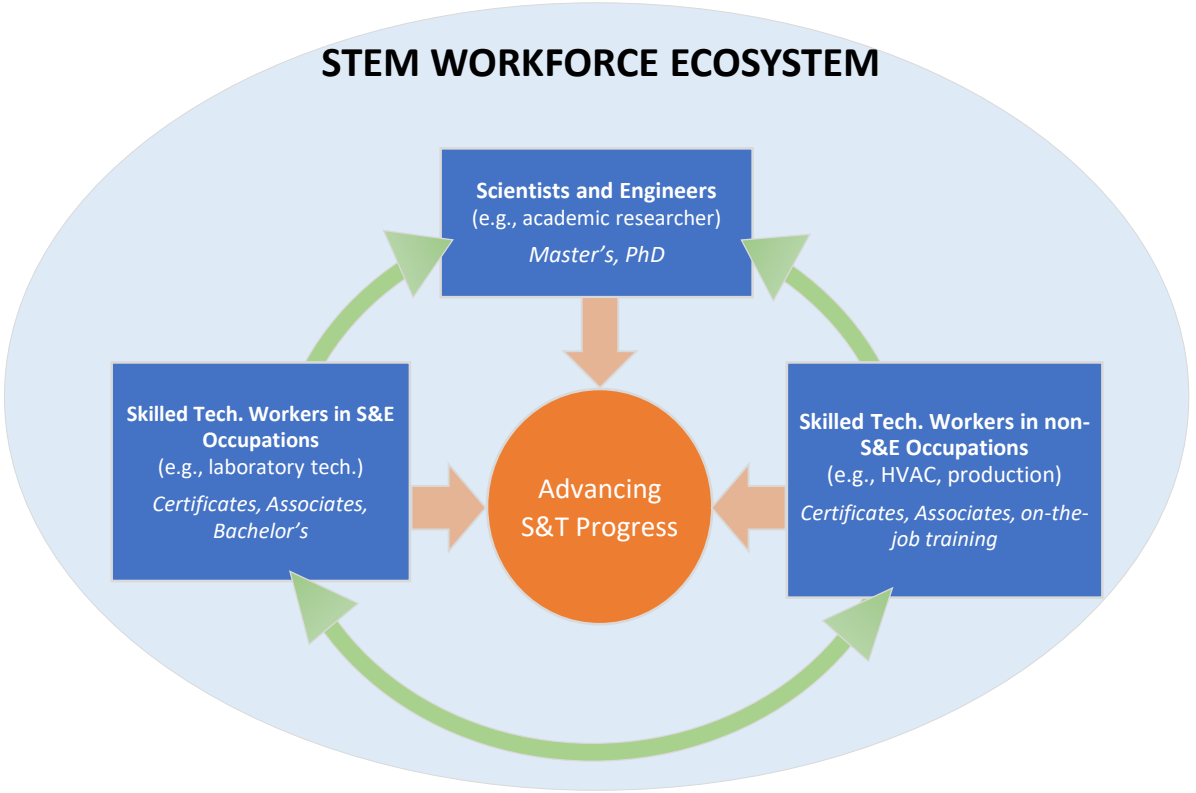
AN ACT

To direct the National Science Foundation to provide grants for research about STEM education approaches and the STEM-related workforce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

NSB Task Force on the Skilled Technical Workforce

- Formally established on November 9, 2017
- Charged to identify the opportunities and challenges facing students, incumbent workers, businesses, educators, and others involved in the STW and recommend to the NSB strategies, including possible polices, for strengthening it.
- Linked to NSF's mission to support "…programs to strengthen scientific research potential and science education programs at all levels …" [42 U.S.C. § 1862(a)(1)].



NSB Statement on Building a STEM-Capable U.S. Workforce

National Science Board
Science and Engineering Indicators 2018

OUR NATION'S FUTURE COMPETITIVENESS RELIES ON BUILDING A STEM-CAPABLE U.S. WORKFORCE

A Policy Companion Statement to *Science and Engineering Indicators 2018*

The number of jobs in the United States (U.S.) requiring substantial science, technology, engineering, and mathematics (STEM) expertise has grown nearly 34% over the past decade. As of 2015, nearly one in seven workers with at least a four-year degree say that their job requires a "bachelor's level" of STEM expertise.[1] Another 16 million skilled technical jobs–more than one in nine–do not require a bachelor's degree, yet require significant expertise in at least one technical field.[2]

At the same time, other countries are challenging U.S. leadership in science and technology. Between 2000 and 2014, the number of Americans with a four-year degree in S&E grew by 53% (483,764 to 741,763); in China, this number was 360% (359,478 to 1,653,565).[3] China's investments in higher education and research and development (R&D) have fueled the rapid growth of its high-technology industries.[4] Their high-tech manufacturing output now ranks number two in the world, trailing only the U.S.[5] China is not alone–other countries are increasing investments in R&D and education to compete with the U.S. (Figure 1).[6]

We Must Take Advantage of our Nation's Greatest Asset–Our People

As science and technology transform our economy and global competition grows, our Nation must focus on its greatest asset–our people. The U.S. can no longer rely on a distinct and relatively small "STEM workforce."[7] Instead, we need a STEM-capable U.S. workforce that leverages the hard work, creativity, and ingenuity of women and men of all ages, all education levels, and all backgrounds.[8] We need scientists searching for cures for genetic disorders, engineers revolutionizing and securing our electrical grid, skilled technicians improving the operations of our research facilities and hospitals, and farmers producing healthier crops utilizing new technologies that at the same time consume fewer resources.

Task Force Activities and Strategy to Date

- Listening Sessions
  - Baton Rouge, LA
  - Warren, MI
  - Community College Innovation Challenge
  - Florence, SC
  - ATE PI Conference (October 25)
- Multiple Board Meetings
- Congressional Testimony/Discussions
- Presentations
- Stakeholder Discussions

Task Force Priority Areas

- Gathering and reporting high-quality, policy-relevant statistical **data** on the STW;

- Engaging in sustained strategic **communication** to highlight the importance of the STW and the contribution of these workers to S&T progress, economic prosperity, security, and other national goals; and

- **Convening** stakeholders to identify strategies to address persistent barriers affecting the STW…

Getting the Message Out…


NATIONAL SCIENCE FOUNDATION
NSB
National Science Board
Est. 1950

EHR

DIRECTORATE FOR EDUCATION & HUMAN RESOURCES

Reskilling America's Workforce:

Exploring the Nation's Future STEM Workforce Needs:

A Spotlight on Engineering and Advanced Manufacturing

Robin Wright

EHR Division of Undergraduate Education, Division Director

National Science Foundation

National Science Foundation
Directorate for Education and Human Resources

Do you remember when…

In the context of STEM education

Do you remember when…

National Science Foundation
Directorate for Education and Human Resources

Council of Economic Advisers

STATEMENTS & RELEASES

CEA Report: Addressing America's Reskilling Challenge

ECONOMY & JOBS | Issued on: **July 17, 2018**

★ ★ ★

https://www.whitehouse.gov/wp-content/uploads/2018/07/Addressing-Americas-Reskilling-Challenge.pdf

National Science Foundation
Directorate for Education and Human Resources

Renewed economic growth, a booming job market, and the evolving nature of work are transforming the face of the labor market, resulting in changes in the skill needs of American employers, as well as new and different opportunities for American workers.

In the United States, investment in skill development is largely "frontloaded" during the first 25 years of life. After that, public contributions to formal education are substantially smaller, and employer training represents the most sizable investment in further developing the skills of the American workforce.

Additionally, there is an information gap between employers, workers, and educational institutions. While employers presumably know which skills they value in an employee, workers themselves and educational institutions have less up-to-date knowledge, and their response lags behind the changing demand.

https://www.whitehouse.gov/wp-content/uploads/2018/07/Addressing-Americas-Reskilling-Challenge.pdf

Reskilling America's Workforce:
Exploring the Nation's Future STEM Workforce Needs
A Spotlight on Engineering and Advanced Manufacturing

National Science Foundation
2415 Eisenhower Avenue, Rooms 2010/2020/2030
Alexandria, VA 22314
September 24-25, 2018

Participants included more than 160 people, representing many sectors.

- Business & industry
- Professional & scientific societies
- Higher education
- Research and Analysis Organizations
- Government (local, city, state, federal)

Selected Speakers

Joseph Aoun, President of Northeastern University

Scott Ralls, President, Northern Virginia Community College

Rosalin Acosta, Secretary of Labor, State of Massachusetts

R. Kirk Jonas, Director, NGA Best Practices, National Governor's Association

Jeff Weld, Senior Policy Advisor, OSTP

Merideth Hatch, Senior Associate Director, Achieving the Dream

Ardine Williams, VP, People Operations, Amazon Worldwide Operations

Michael Carren, Head of Corporate Responsibility, The Guardian Life Insurance Company

Mike Mariner, Cofounder, Roadtrip Nation

Kennan Jarboe, Senior Program Officer, Manufacturing, Design, and Innovation, NAS

Stephanie Marken, Executive Director of Higher Education Research, Gallup

NSF Investments in workforce development were highlighted.

Directorate for Education and Human Resources

- Advanced Technological Education Program (Thomas Higgins)
- Division of Graduate Education (Nimmi Kannankutty)

Directorate for Engineering

- Division of Industrial Innovations and Partnerships (Barry Johnson)
- Division of Engineering Education and Centers (Don Millard)

Roundtable Discussions

How can we build talent pathways through industry-recognized credentials?

How can we ensure access and equity in the STEM and digital skills workforce?

What are effective pathways and policies for the STEM and digital workforce of the future?

How can we reskill the engineering and advanced manufacturing workforce?

How do we develop an employee-driven agenda?

In what ways are two- and four-year institutions working effectively to build regional talent hubs?

First Impressions

Next steps: Additional workshops focused on other areas of particular workforce needs

Next steps: The AC's STEM Education of the Future Subcommittee is working on related issues.

Discussion: Do we need to reinvent STEM education so our country continues to be the world's engine of innovation and opportunity?

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Lunch 11:30 – 11:50AM

Please proceed to the cafeteria around the corner to purchase lunch and return for discussion.

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Discussion questions

- STEM Workforce Development is one of EHR's pillars. What does EHR need to do to position itself to lead in developing the STEM workforce of the future?
- Given the update on the Reskilling American's Workforce workshop, what next steps should EHR take to follow up on the momentum of this workshop?
- How might EHR frame a research agenda around (continual) workplace learning?
- Are there questions or comments about this session that you'd like to discuss with NSF leadership?

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NSF Big Idea: What is Mid-Scale Research Infrastructure and How Might it Benefit EHR Communities?

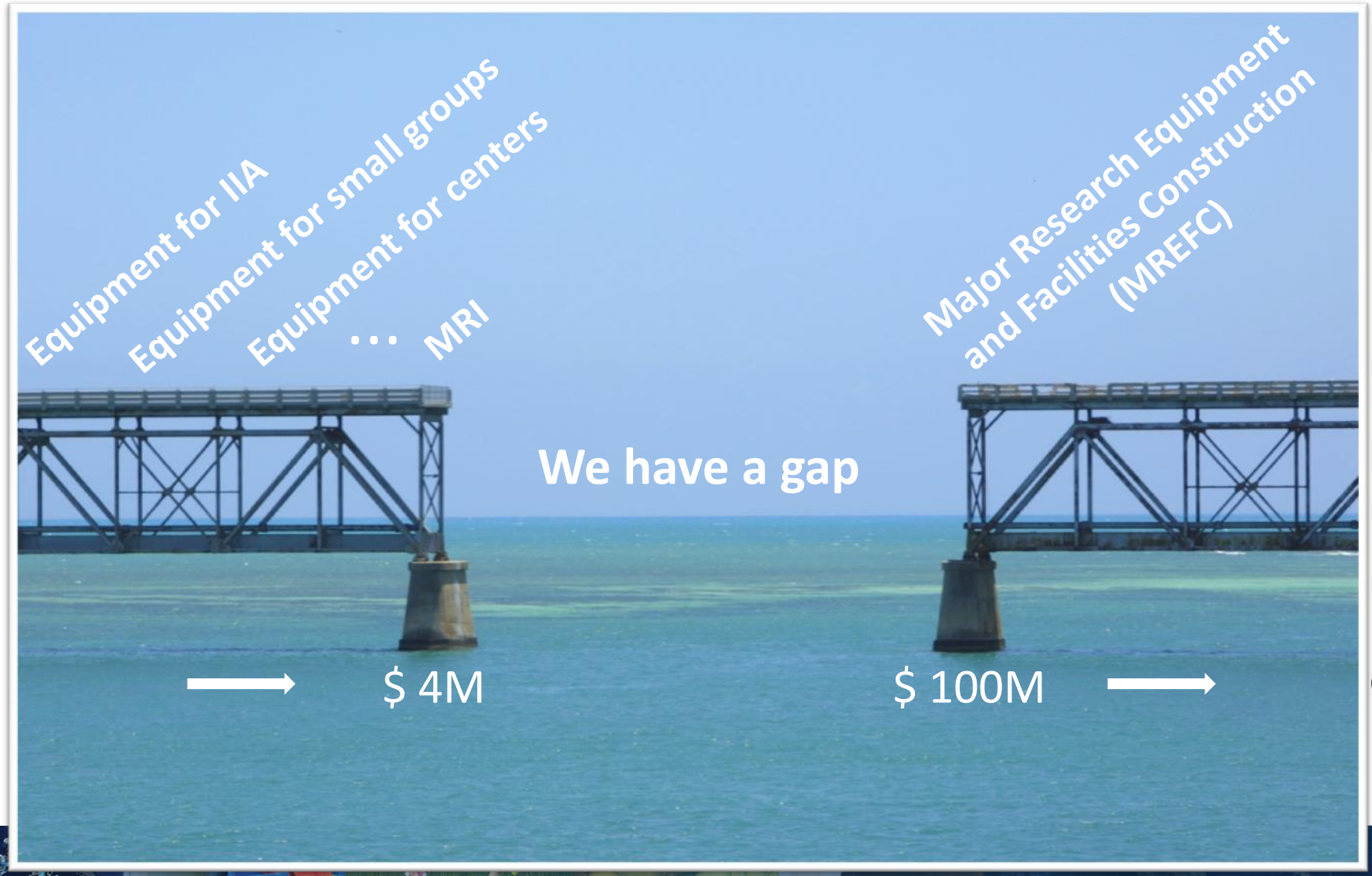
Moderator: Karen King

Program Director, DRL and Co-Executive Secretary, Committee on Strategy for National Science Board

Mid-scale Research Infrastructure

Jim Ulvestad
Chief Officer for Research Facilities
October 18, 2018

A Neglected Scale of Infrastructure



Crim & Kurose, NSB, November 2015

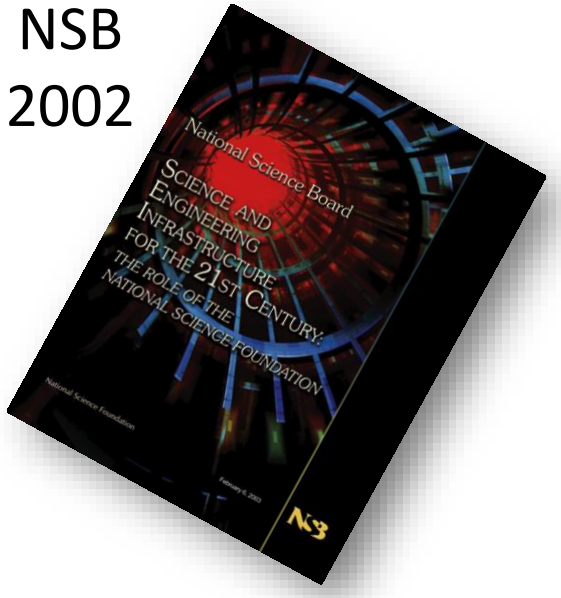
Photo Credit: Nathan D. Holmes

National Science Board Report NSB 11-80

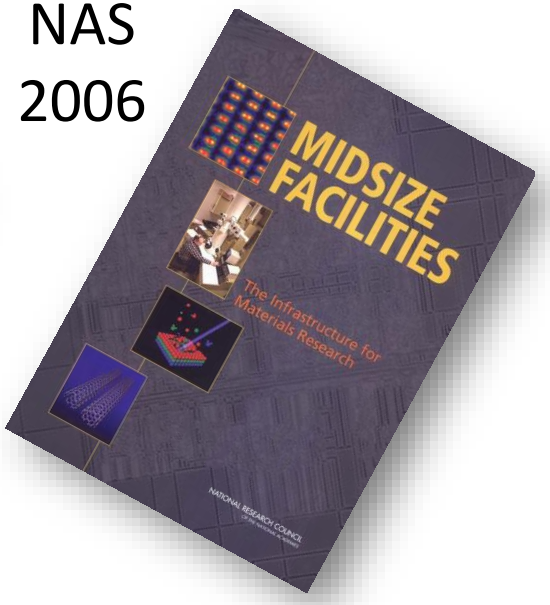
- 2011 report on mid-scale instrumentation in response to America COMPETES Act of 2010.
- “the Board does not recommend that NSF expand existing Foundation-wide programs or create a new Foundation-wide program for mid-scale instrumentation at this time.

Examples of Community Calls

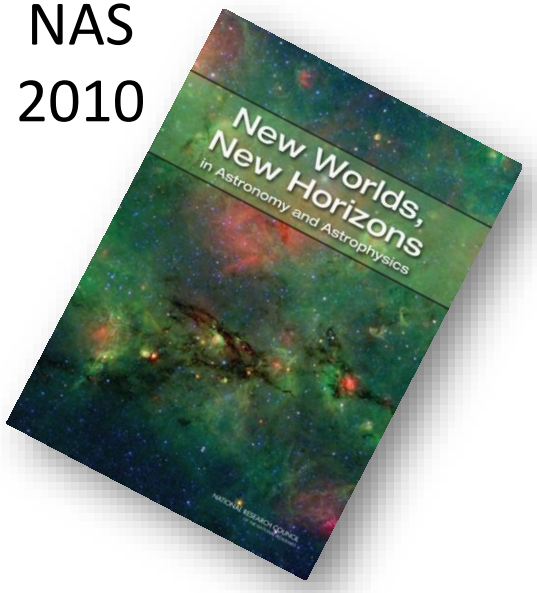
NSB 2002



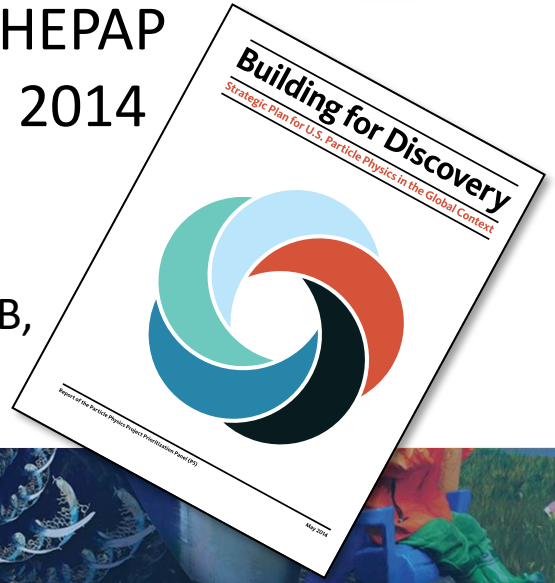
NAS 2006



NAS 2010

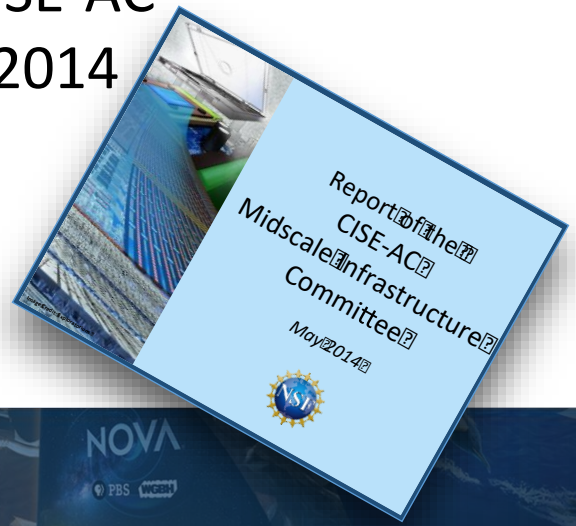


HEPAP 2014



NSAC 2014

CISE-AC 2014



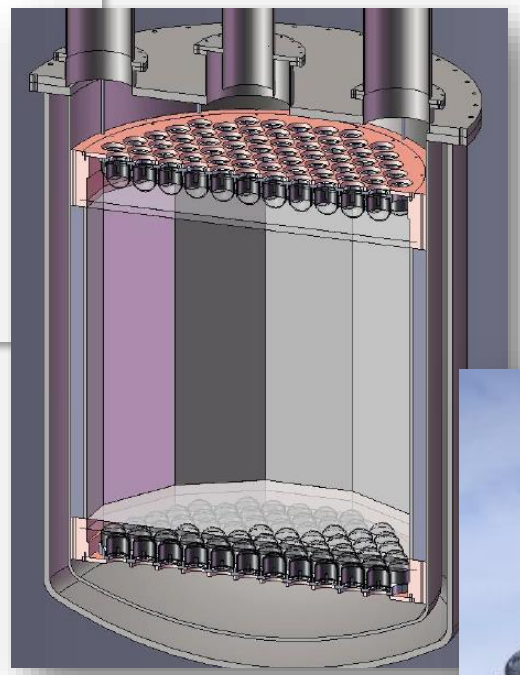
Crim & Kurose, NSB, November 2015

Neglected but not ignored

Limited funding carved out of existing budgets

geni
Exploring Networks of the Future

Global Environment for Network Innovations (CISE) $30M



Xenon 1T Dark Matter Project (MPS/PHY) $12M

A-10 Storm Penetrating Aircraft (GEO/AGS) $13M

Crim & Kurose, NSB, November 2015

Missing important opportunities

The ways of doing science are changing -particularly with respect to infrastructure

Increasing reliance on cyberinfrastructure

Increasingly diverse scales (space, $, time)

Increasingly dynamic

Issues

- Funding
- Agility – shorter timescales
- Matching oversight to scale
- Rapidly evolving technologies
- Varied operational models
- • •

How do we innovate to meet these evolving needs?

Do we need new programs and processes?

Crim & Kurose, NSB, November 2015

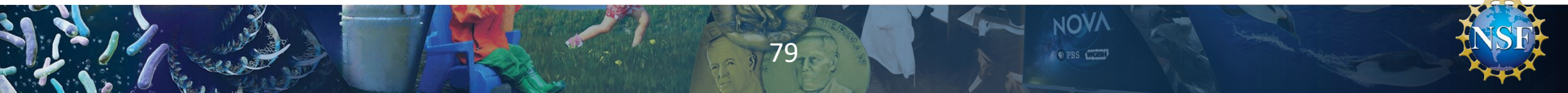
The NSF Big Idea on Mid-scale

American Innovation and Competitiveness Act (AICA), Public Law 114-329, January 2017

- Section 109: NSF Mid-scale Project Investments
  - (a)(2) “Modern and effective research facilities, infrastructure, and instrumentation are critical to maintaining United States leadership in science and engineering.”
  - (b)(1) “The Foundation shall evaluate the existing and future needs, across all disciplines supported by the Foundation, for mid-scale projects.”
  - (b)(2) “The Director of the Foundation shall develop a strategy to address the needs identified in paragraph (1).”
  - (b)(4) “the term ”mid-scale projects” means research instrumentation, equipment, and upgrades to major research facilities or other research infrastructure investments that exceed the maximum award funded by the major research instrumentation program and are below the minimum award funded by the major research equipment and facilities construction program as described in Section 507 of the AMERICA Competes Reauthorization Act of 2010.”

NSF Request for Information

- Responsive to AICA, Sec. 109(b)(1), NSF issued a Request for Information on Mid-Scale Research Infrastructure, NSF 18-013, in October 2017.
- Sought input only on projects in the $20 million to $100 million range.
- ”For the purposes of this RFI, NSF defines Research Infrastructure (RI) as any combination of facilities, equipment, instrumentation, computational hardware and software, and the necessary human capital in support of the same. This includes upgrades to existing major research facilities.”
  - Trying to avoid overlap and recycled “Center” proposals.



RFI Responses: 192 total, ~$10 billion

DIR	#	High
BIO	13	2
CISE	16	7
EHR	3	1
ENG	27	5
GEO	58	33
MPS	60	36
SBE	15	2

Big Idea	High
FutWk	1
HDR	6
NNA	7
Quantum	9
URoL	2
Windows	15

Another NSB Report Required!

- House Appropriations language, FY 2018: “The Committee is supportive of recent actions to lower the MREFC threshold but encourages the National Science Board to consider further changes that would bridge the gap between the Major Research Instrumentation program and the MREFC account while also developing processes appropriate for mid-scale infrastructure, cyberinfrastructure, and instrument upgrades to be funded through the MREFC account. The Board shall, in collaboration with the National Academies, examine these requirements and report to the Committee within 180 days after enactment of this Act regarding its recommendations on how to address this matter within the confines of a restricted funding environment.”

NSB-2018-40 (October 2018)

- "Bridging the Gap: Building a Sustained Approach to Mid-scale Research Infrastructure and Cyberinfrastructure at NSF."
- Recommendations:
  - "NSF should affirm and sustain the mid-scale Big Idea with a long-term *agency-level* commitment to mid-scale research infrastructure."
  - "NSF should investigate the feasibility of using the MREFC account as one possible funding mechanism."
  - "NSB and NSF should review existing infrastructure oversight and management structures to ensure compatibility with mid-scale range investments."
  - "NSF, in cooperation with NSB, should develop an evaluation and assessment program to determine the full scope of the demand for mid-scale research infrastructure and ensure NSF's programs and processes address that demand."

NSF FY 2019 Budget Request

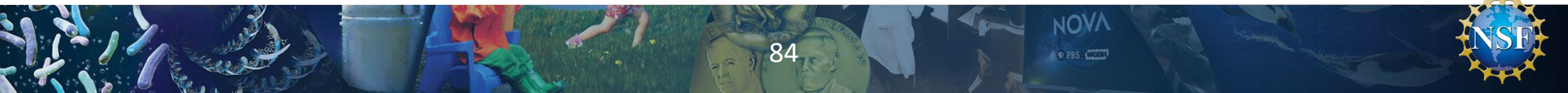
NSF's 10 BIG IDEAS FY 2019 REQUEST FUNDING

(Dollars in Millions)

Big Ideas	FY 2019 Request
Research Ideas	**$180.00**
Harnessing the Data Revolution for 21st- Century Science and Engineering - HDR (CISE/ITR)[1]	30.00
Navigating the New Arctic - NNA (GEO/ICER)	30.00
The Future of Work at the Human-Technology Frontier - FW-HTF (ENG/EFMA)[1]	30.00
The Quantum Leap - QL (MPS/OMA)	30.00
Understanding the Rules of Life - URoL (BIO/EF)	30.00
Windows on the Universe - WoU (MPS/OMA)	30.00
Process Ideas	**$102.50**
Growing Convergence Research - GCR (IA)	16.00
Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science - NSF INCLUDES (EHR)	20.00
Mid-Scale Research Infrastructure (IA)	60.00
NSF 2026 Fund (IA)	6.50
Total, NSF Big Ideas	**$282.50**

Mid-scale Working Groups

- Two working groups, covering (roughly) the funding ranges of $6-20 million and $20-70 million.
  - $6-20 million: chaired by Randy Phelps (OIA)
  - $20-70 million: co-chaired by Allena Opper (MPS) and Brian Midson (GEO)
- These working groups, with guidance from NSF leadership, are responsible for developing implementation plans.



Where Are We Now?

- Working on implementation of the mid-scale program for FY 2019.
  - Stay tuned!
- Developing further strategy, responsive to the recent NSB report, for mid-scale research infrastructure in FY 2020 and beyond.
  - There is a clear push from Congress and NSB to create a sustainable cross-NSF strategy/investment.
  - NSF has to manage carefully to ensure that the requirements of $500 million pieces of infrastructure do not get imposed on $10 million awards.

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Mid-scale Research: Programmatic Experience

Allena Opper

Program Director, Directorate of Mathematical & Physical Sciences

National Science Foundation

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Mid-scale Research Infrastructure: Programmatic Experience
– the experience of one PO

My portfolio:

- Experimental Nuclear Physics (ENP) Program
- ENP MRIs & ENP CAREERs
- 3 PHY Mid-scale projects
  - MUSE: $3.6M
  - LEGEND-200: NSF contribution = $7.5M, other = $30M
  - nEDM: NSF contribution = $13M, DOE contribution = $34M

  1. PHY Mid-scale: TPC = $4 – 15 M; R&RA
  2. All required years and $ from *program* for pre-implementation R&D
  3. Coordinate and co-fund with other agencies
  4. Learned a lot of project management *oversight* from working with DOE
- National Superconducting Cyclotron Facility (NSCL): $24M/yr
  - Identified as high priority through wide review and strategic planning exercises

Allena K. Opper MPS/PHY

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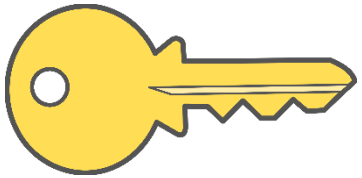
What are the pros and cons of including mid-scale research infrastructure in a program and a portfolio?

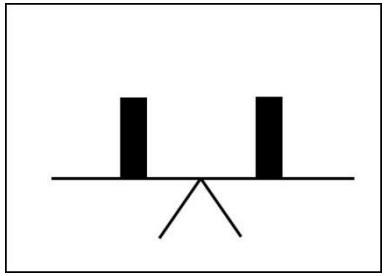
Pros

- Opportunity for significant impact to the field
- Stimulate future opportunities (large and small)
- Focal point for research community
- Increased visibility



Cons

- Challenge of identifying priorities of research community (keeping it from being a political decision)
- *Strategic* nurturing of R&D to get to "project" phase
- *Appropriate* level of review and oversight
  - TPC not the only metric
- Balance
- Increased visibility



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How does a program think about operations and maintenance? Carefully and strategically

Operations and Maintenance (O&M) varies widely

- Technical personnel (machinists, vacuum tech, small and large tool tech, computational tech, data management tech, …), standing army
- Power, water, cooling, …
- Expendable supplies
- Scheduled maintenance of components or data

Staged i.e. start with small projects that can be upgraded

Leverage funds

- Co-fund with division
- Co-fund with other agency – but be cautious of dependencies

O & M not Research Support!

Awardee

Lost opportunities without investment in mid-scale infrastructure

Allena K. Opper MPS/PHY

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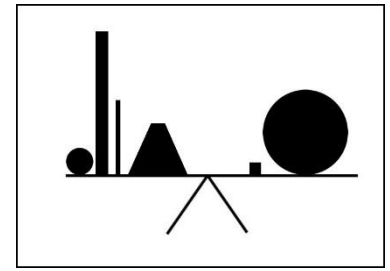
How do these investments affect thinking about portfolio balance and evaluating the portfolio?

Mid-scale projects add another dimension to balancing a portfolio

- Ratio of Research in Undergraduate Institutions (RUI) to non-RUI
- Balance across sub-areas of program
- Risk vs opportunity



The mid-scale dimensions:

- Potential impact to the field
  - Percentage of research community who will utilize the infrastructure (~ 1/3 of ENP community uses NSCL)
  - Impact on the field even if small percentage of community actively involved (~ 1/8 of ENP community involved in $0\nu\beta\beta$)
- Risk – construction projects carry more risk than acquisition projects
- Cost to program (R&D and O&M)

Will the community be comfortable with trade-offs needed to gain the infrastructure?

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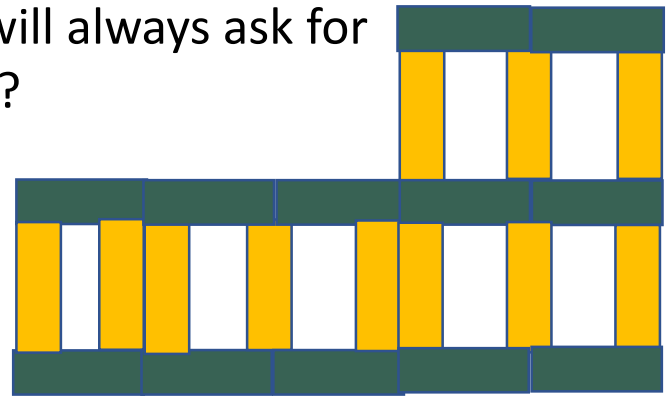
When is mid-scale infrastructure too “niche-y” and when is it central or scalable?

Too “niche-y” = only those people who will directly use the infrastructure appreciate the science it can enable

Central = identified by the community as a high priority

- National Academies reports
- Community advisory/planning committee reports
- President’s Council of Advisors on Science and Technology (PCAST) reports
- Caution: reports from professional societies will always ask for resources – do they prioritize those resources?



Scalable projects = good strategy

- Clearly define infrastructure capabilities
- Build in off-ramps
- Discovery potential at early stages!

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The Institute for Research on Innovation & Science

Earnestine Easter

Program Director, EHR Division of Graduate Education (DGE)

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IRIS

INSTITUTE FOR RESEARCH ON INNOVATION & SCIENCE

"IRIS data allow observational experiments that can directly … {track} how scientific training affects career trajectories and returns to industry."

ASSESSMENT

Academic return

A broader understanding of 'impact' could help governments to measure the diverse benefits of their investment in research.

BY MICHAEL EISENSTEIN

When Julia Lane began working in scientific-funding policy she was quickly taken aback by how unscientific the discipline was compared with the rigorous processes she was used to in the labour-economics sector. "It was a relatively weak and marginalized field," says Lane, an economist at New York University.

In 2005, John Marburger, science adviser to then-President George W. Bush, felt much the same. He called on researchers and policymakers to focus on the "science of science policy", an empirical assessment of outcomes and returns from funding agencies such as the National Institutes of Health (NIH) and National Science Foundation (NSF). "When the Congressional Budget Office does simulations of the effects of investment in areas like tax or education policy, they have models and processes," says Lane. "But he said that when it comes to science, essentially all we say is 'send more money'."

Around the same time, the UK government also began to explore how to significantly increase the economic impact of the country's research and development (R&D) investments. According to Lane, such efforts have historically been a low priority, because R&D accounts for only a small percentage of the economy — typically less than 3% of the gross domestic product (GDP), mostly from the private sector. However, public funding of basic research still represents a considerable sum.

In 2013, the United States spent more than US$40 billion on research at university- or government-run laboratories. Finding out what comes of this expenditure is crucial for economic reasons, but also has a moral dimension. "We can't sit in an ivory tower and expect the taxpayer to pay our salaries and not ask any questions," says Ben Martin, who specializes in science and technology policy at the University of Sussex, near Brighton, UK. Over the past 10–15 years, economists and policy experts have been trying to build smarter tools to answer such question about how public research investments payoff — a process that has entailed an examination of what precisely it means to get a return on R&D.

NUMBER CRUNCH

The earliest efforts approached this question purely in economic terms. Martin and his colleague Ammon Salter, now at the University of Bath, UK, reviewed[1] studies on the benefits of publicly funded basic research — including pioneering work by the US economist Edwin Mansfield, who surveyed businesses to learn what proportion of their products arose from this type of research and determined a 28% rate of return. However, they found that these studies generally took an overly simple approach to tackling a complex question. "We concluded that there are too many conceptual, methodological and empirical problems with these kinds of efforts," says Martin.

Economic analysis is complicated by numerous intermediate indicators of performance (number of patents licensed, for example), as well as more direct impacts such as the number of products sold. The true impact emerges from a combination of these factors. "The temptation to come up with a number for an impressive-looking economic return can be strong," says Adam Jaffe, director of Motu Economic and Public Policy Research in Wellington, New Zealand, "but I'd argue that you should look at a range of different indicators, including qualitative information."

The most comprehensive studies tend to be technology- or field-specific. In 2008, the research institute RAND Europe teamed up with academics to analyse the impact of UK research grants for cardiovascular disease and stroke[2]. They used a strategy called the payback framework, which combines surveys and data analysis to assess the impact of research across many domains, rather than just basic economic gain. "You might prove that a method of developing stents for heart disease has generated jobs in industry, new skills, new research areas, benefits for patients who receive stents, and economic benefit in terms of helping these patients to return to work," explains Steven Wooding, a researcher at RAND. "Then, at the other end, you can figure out what each one is worth." They concluded that every £1 (US$1.43) invested in cardiovascular-disease research between 1975 and 1992 generated £1.39 of return in economic and health terms. However, this method is labour intensive and designed for biomedical research.

Patents based on academic research can provide a useful general indicator of commercial interest in a particular invention. But this is not always straightforward to interpret because not all patents become products. Furthermore, the public-sector origins of private-sector patents are not always obvious. A team led by Danielle Li at Harvard Business School in Boston, Massachusetts, has attempted to clarify these links by forging connections between NIH grants,

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IRIS INSTITUTE FOR RESEARCH ON INNOVATION & SCIENCE

2018 IRIS Data Release includes

- Information on 296,000 + sponsored projects
- 478,000 + employees on those projects
- 246,000 + graduate and undergraduate students

Linkages to

- ~29,000 Proquest dissertations
- Patents & Publications (MedLine)
- 82,000 + NIH-NSF-USDA Award Abstracts
- Census Bureau earnings data (LEHD)

Research Data

Census Data access through FSRDC System

IRIS Data access through Virtual Data Enclave

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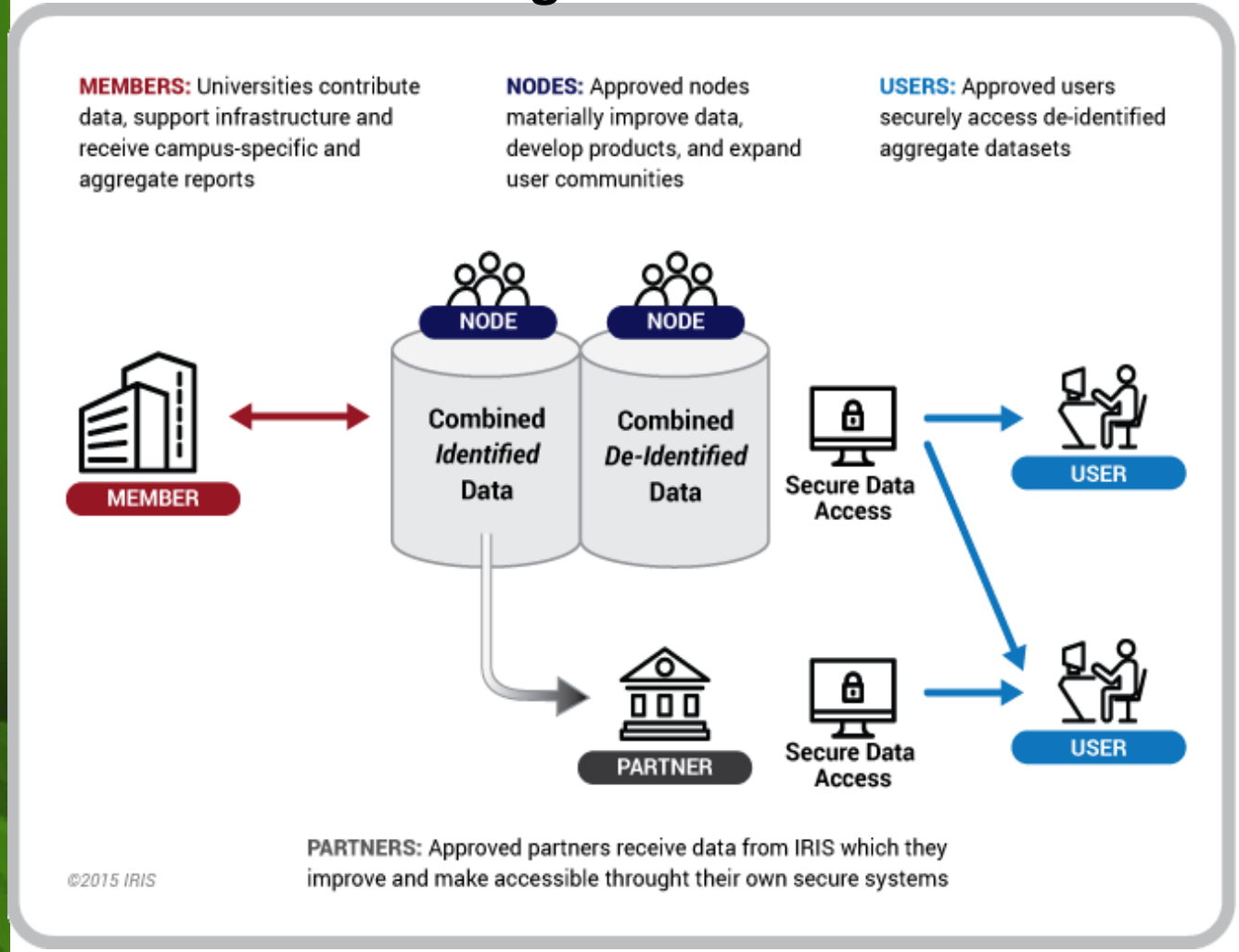
Organization



- 33 universities
- 1/3 federal R&D spending
- 30% doctorate degrees
- 84 researchers from 21 institutions using data through IRIS Virtual Data Enclave

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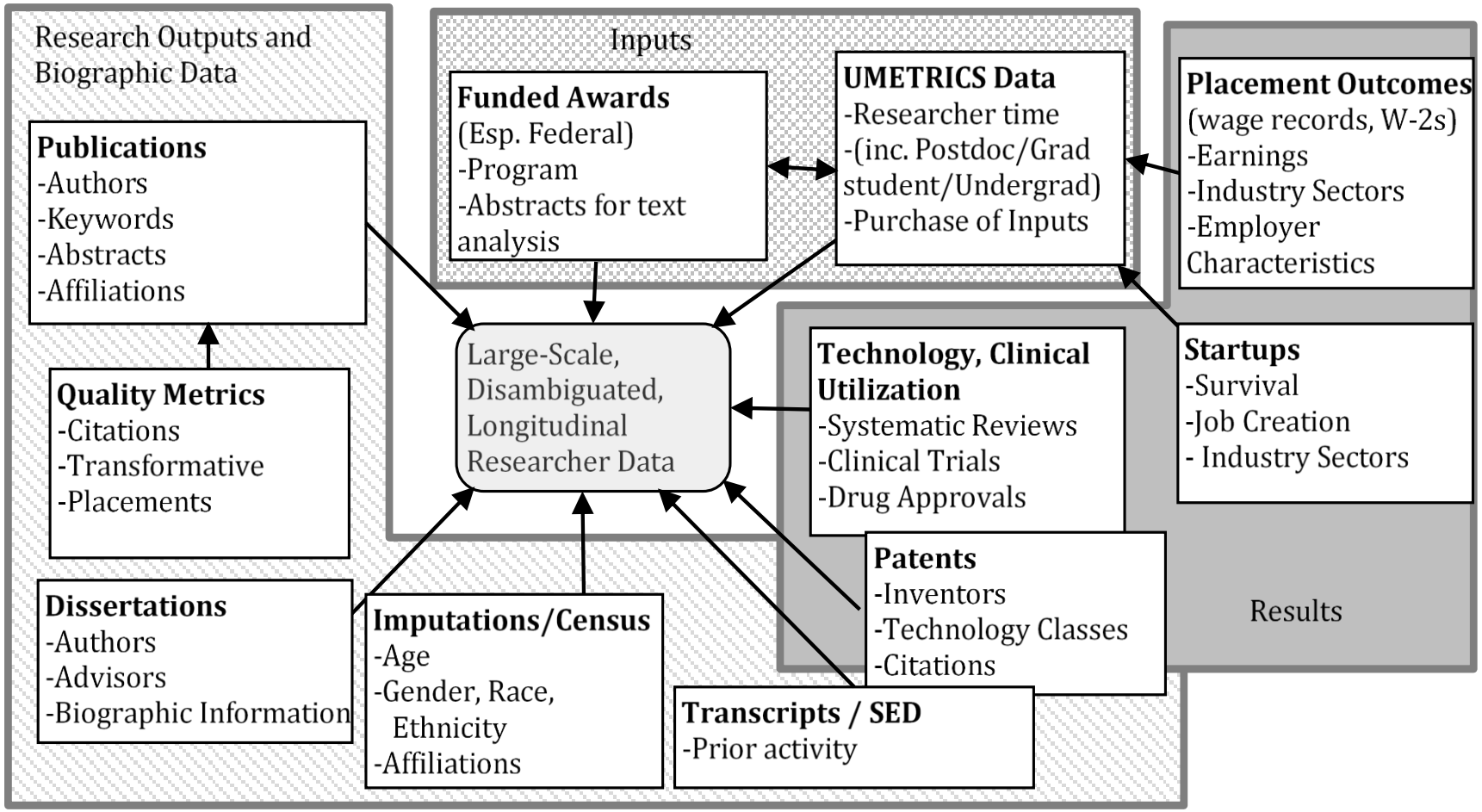
IRIS INSTITUTE FOR RESEARCH ON INNOVATION & SCIENCE



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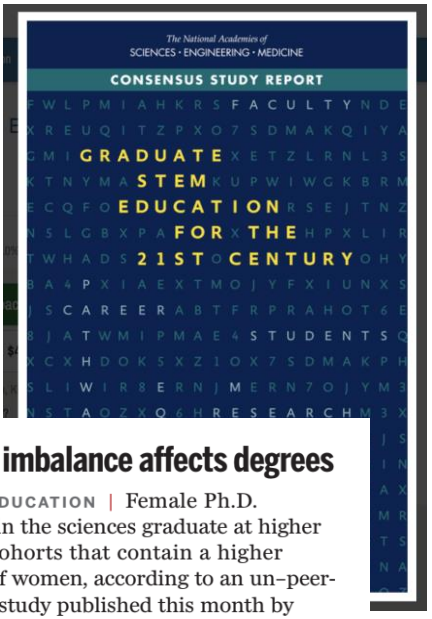
IRIS INSTITUTE FOR RESEARCH ON INNOVATION & SCIENCE

UMETRICS offers unique possibilities for examining

- Team and peer composition effects
- Scientific outcomes (Dissertations, publications)
- Non-Academic Career outcomes
- Effects of different funding mechanisms
- Gender & URM participation and outcomes

Examples

- Gender imbalanced Ph.D. programs decrease female completion rates (Bostwick & Weinberg 2018)
- Female Ph.Ds. are trained in more female dominated research teams (Buffington et al 2016)



Gender imbalance affects degrees

HIGHER EDUCATION | Female Ph.D. students in the sciences graduate at higher rates in cohorts that contain a higher fraction of women, according to an un–peer-reviewed study published this month by the National Bureau of Economic Research. Researchers examined graduation data for 2541 students in science, technology, engineering, and math who entered 33 doctoral programs at six universities in Ohio between 2005 and 2009. Women with no female peers completed degrees within 6 years at a rate 12 percentage points lower than men in the same cohort. But for each increase of 10% in the proportion of female students in a cohort, their graduation rate increased by 1 percentage point. Programs that enrolled fewer than four in 10 women, on average, accounted for most of the disparity in graduation rates. The findings suggest a lack of gender balance in an incoming cohort may influence its cultural environment, making a Ph.D. program less friendly to women.

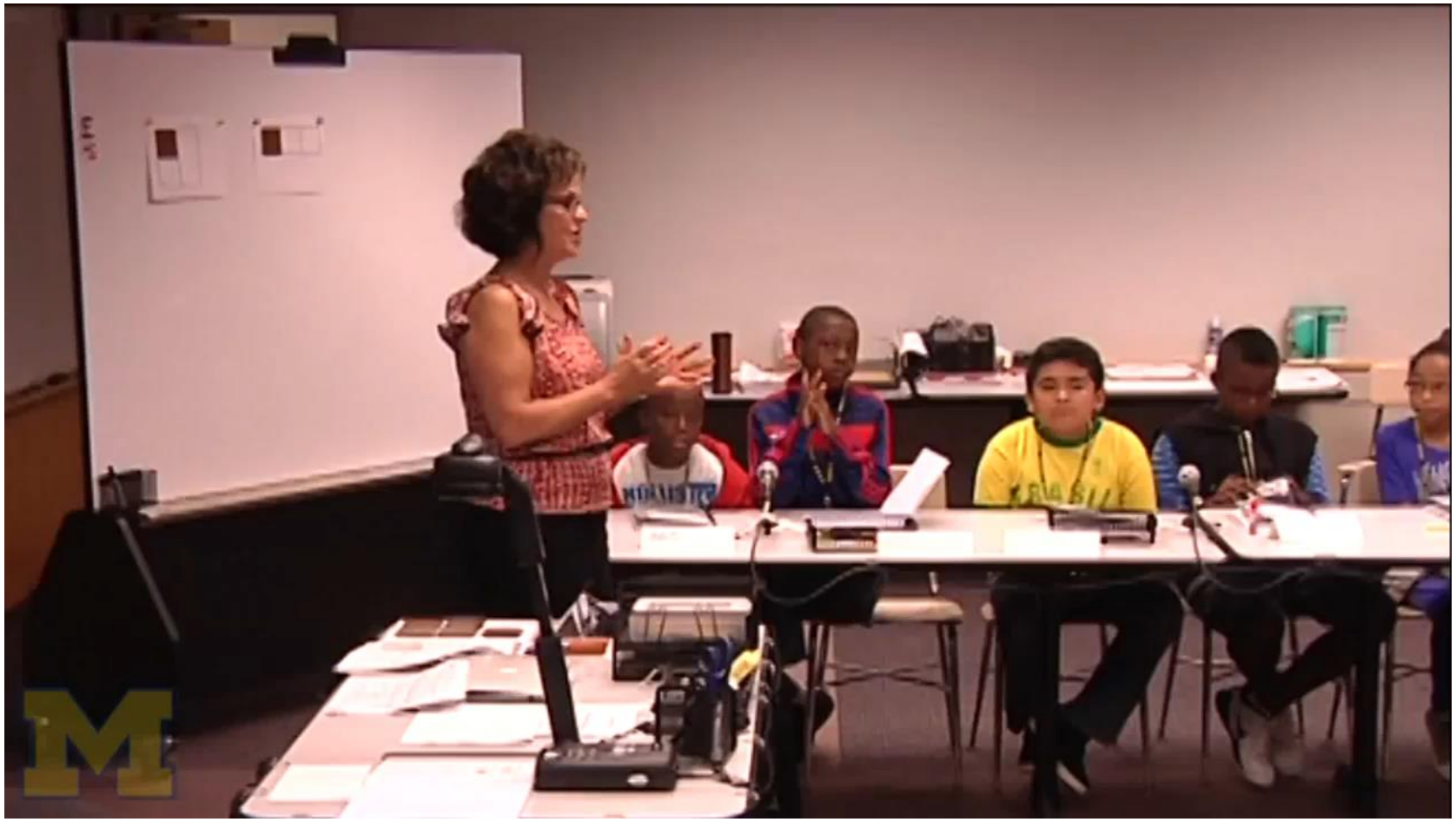
Science 361 (6409)

National Science Foundation

Examples of Mid-Scale Research Infrastructure

Karen D. King, PhD
Division of Research on Learning in Formal and Informal Settings

University of Michigan Elementary Math Lab



Databrary

- Video data library/repository for social scientists
- Allows researchers to:
  - Search available video and audio clips
  - Share data to improve transparency and reproducibility
  - Archive data
  - Use data for secondary analysis
- Worldwide usage

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Discussion questions

- What are potentially worthy mid-scale research infrastructure investments for EHR?
- What trade-offs or implications are important to consider before investing in mid-scale research infrastructure?
- Are there questions or comments about this session that you'd like to discuss with NSF leadership?

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Mid-Afternoon Break
1:45 – 2:00PM

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Recent Awards and Activities Related to Broadening Participation and Institutional Capacity

Moderator: Jermelina Tupas

Acting Director, EHR Division of Human Resource Development (HRD)

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NSF INCLUDES EHR Advisory Committee Update

Sylvia James

Acting Deputy Assistant Director, EHR

Paige Smith

Program Director, Directorate for Engineering (ENG)

National Science Foundation

NSF INCLUDES
EHR Advisory Committee Update
October 18, 2018

NSF INCLUDES

Inclusion across the **N**ation of **C**ommunities of **L**earners of **U**nderrepresented **D**iscoverers in **E**ngineering and **S**cience

NSF INCLUDES

A ***comprehensive national initiative*** designed to enhance U.S. leadership in discoveries and innovations by focusing on diversity, inclusion and broadening participation in STEM ***at scale***.

The Five Elements of NSF INCLUDES

NSF INCLUDES History (Years 1-2)

- **Year 1 (FY 2016)**
  - First cohort of 40 Design and Development Launch Pilots (DDLPs, NSF 16-544)
  - 13 Conferences/ Workshops (Dear Colleague Letter 16-081) supported
  - 3-year evaluation contract for developmental evaluation with 2M/Mathematica
  - 3-year technical assistance contract with EDC/Westat/Equal Measure
- **Year 2 (FY 2017)**
  - First PI Meeting (January 4-6, 2017)
  - Second cohort of 30 DDLPs (NSF 17-522) funded

NSF INCLUDES DDLPs

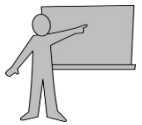
70 Design and Development Launch Pilots were awarded grants in FY2016 and FY2017 to address broadening participation challenges such as…

…expand access to quality STEM education

5 projects

…address career needs of the STEM professionals

6 projects



…prepare STEM educators

10 projects

…address students' STEM identity, attitudes, motivation

10 projects

…strengthen institutional capacity

11 projects

…enhance support systems for undergrad and grad STEM students

20 projects

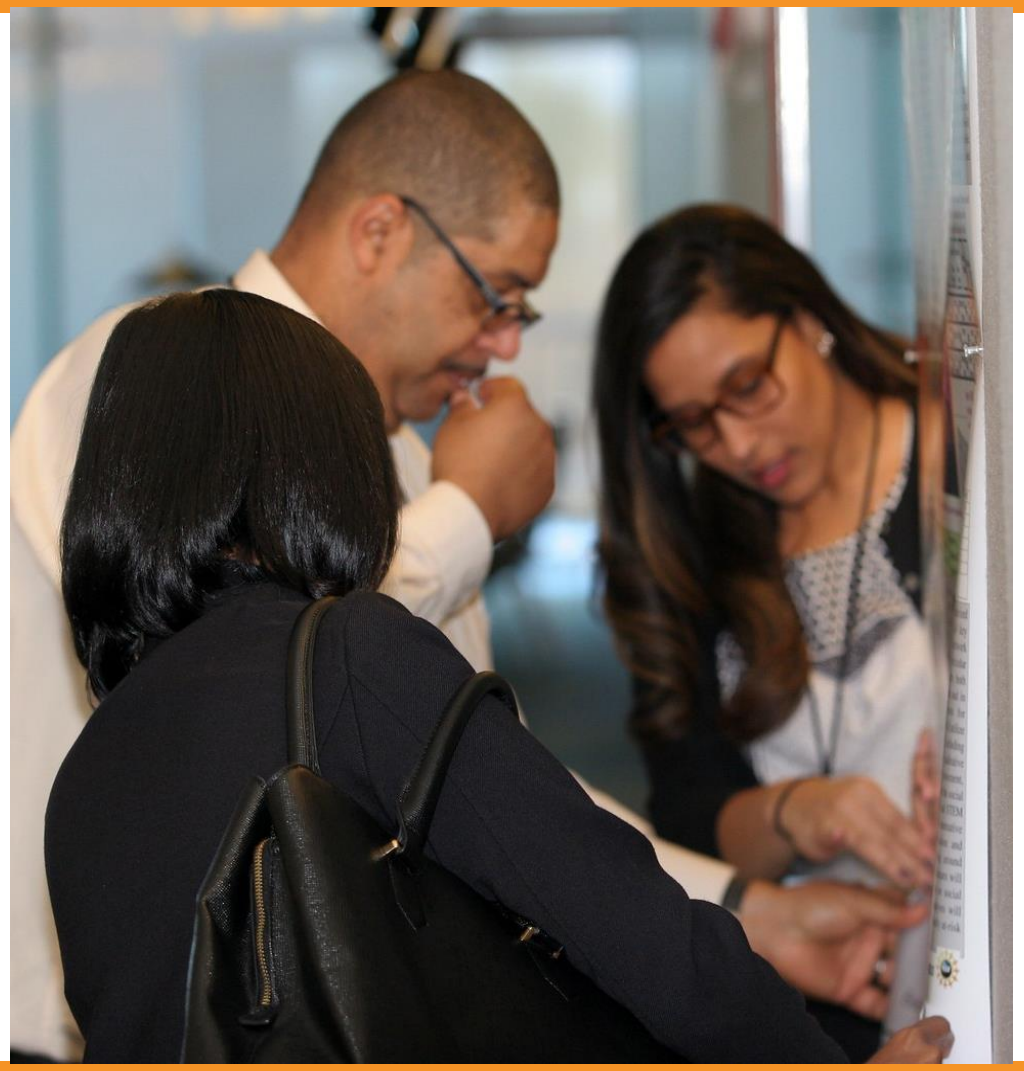
…provide engaging STEM activities for students and the community to promote STEM studies and careers

42 projects

Image credits: Clker.com

***Note**: Some individual projects have goals and objectives that fall into more than one category.*

PARTNERSHIPS



758 partner organizations working to broaden participation in STEM through collaborative change, including…

4	libraries
13	federal/national labs & centers
58	government agencies & affiliates
94	K-12 schools & school districts
313	colleges, universities & community colleges
10	private foundations
49	professional & higher education organizations
62	corporations & corporate affiliates
107	non-profit & community organizations
	…and many more

NSF INCLUDES History - Year 3 (FY 2018)

Year 3: Connecting to the NSF Portfolio

- Second PI Meeting + Center Summit (January 8-12, 2018)
- *Report to the Nation* published
- On-Ramps to the NSF INCLUDES National Network
  - 13 Supplements/EAGERS/Conferences supported (DCL 17-111)
  - NSF INCLUDES Co-funded: 3 Alliances for Graduate Education, 2 Broadening Participation in Computing and 5 Louis Stokes Regional Centers of Excellence awards
- **Coordination Hub** (NSF 17-591) awarded as cooperative agreement
- First cohort of **5 Alliances** (NSF 18-529) awarded as cooperative agreements
  - Alliances co-funded by AGEP, CREST, EPSCoR, HSI and MPS programs

The NSF INCLUDES Coordination Hub

Award # 1818635

The Hub will facilitate activities needed to build and maintain a strong ***NSF INCLUDES National Network****, including communications, technical assistance and efforts aimed at increasing visibility. The Hub itself is a collaboration of multiple institutions.*

SRI International (lead)

Westat

QEM

EQUAL MEASURE | FINDING PROMISE FUELING CHANGE

EDC Education Development Center

Digital Promise
Accelerating Innovation in Education

Georgia Tech Constellations

ORSIMPACT (external evaluator)

The NSF INCLUDES Alliances

Computing Alliance of Hispanic-Serving Institutions

(Award 1834620; University of Texas at El Paso)

CAHSI — Establishing a Networked Community for Broadening Participation of Hispanics in Graduate Studies

STEM Core Expansion

(Awards 1834628, 1834608)

Expanding the First2 STEM Success Network

(Awards 1834601, 1834569, 1834586, 1834575, 1834595)

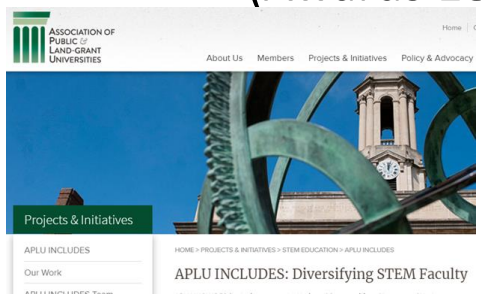
Inclusive Graduate Education Network

(Awards 1834540, 1834528, 1834516, 1834545)

IGEN

Aspire: National Alliance for Inclusive and Diverse STEM Faculty

(Awards 1834518, 1834522, 1834526, 1834513, 1834510, 1834521)



Boeing MOU with NSF/EHR

NSF director, France Cordova, worked on the STEM training partnership with Heidi Capozzi, senior vice president of human resources at Boeing. (NSF Photo)

- Boeing is the first business to contribute to NSF INCLUDES nationally
- The Boeing $1 million gift will be used to target women, especially women veterans, returning to the STEM workforce

Building the NSF INCLUDES National Network in Year 4 (FY 2019)

Year 4: Connecting the Network

- NSF INCLUDES Alliances and Coordination Hub Kick-off (October 3, 2018)
- STEM Funders Collaborative Meeting (October 25-26, 2018)
- Convening the NSF INCLUDES National Network (January 2019)
- Second round of NSF INCLUDES Alliances (NSF 18-529, Deadline: April 2, 2019)
- Report to the Nation 2

What Should the NSF INCLUDES National Network Look Like?

How might it…

- Include NSF INCLUDES Alliances, and retain Design and Development Launch Pilots and on-ramps?
- Encourage NSF awards to link to NSF INCLUDES?
- Engage organizations and individuals with/without NSF funding?
- Offer a shared repository of data, reports, research, strategies and models to address BP challenges?
- Produce a sustained commitment across all dimensions of BP?

Network Benefits could include…

- Mechanisms to engage new members
- Access to resources
- A funders collaborative to provide access to local and regional funders
- Certification as NFS INCLUDES Leaders; prizes/awards and recognition for BP work
- Training and education opportunities
- Support to replicate and adapt/adopt approaches to address BP challenges

What Should the NSF INCLUDES National Network Look Like?

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Your Thoughts?

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HBCU-Undergraduate Program: Excellence in Research (EiR) Track

Brandon Jones, Program Director, GEO

EHR Advisory Committee Meeting

October 18, 2018

National Science Foundation

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HBCU Excellence in Research (EiR)

- **The new Excellence in Research (EiR) component in HBCU-UP was developed in response to *Congressional mandate* to increase support for research at HBCUs.**

- **EiR supports projects that enable STEM and STEM education faculty at HBCUs *to conduct research* and to further develop research capacity.**

- **EiR aims to accelerate support of research at HBCUs *across NSF's full portfolio*.**

- **Budget**
  - **$20 million in FY18**
  - **$10 million in FY19**

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NSF Organizations Participating in EiR

Directorates

- **Biological Sciences (BIO)**
- **Computer and Information Science and Engineering (CISE)**
- **Education and Human Resources (EHR)**
- **Engineering (ENG)**
- **Geosciences (GEO)**
- **Mathematical and Physical Sciences (MPS)**
- **Social, Behavioral and Economic Sciences (SBE)**

$ **Office of Integrative Activities (OIA)**

EiR Working Group

BIO

- Engin Serpersu
- Jodie Jawor

CISE

- Fay Cobb Payton

EHR

- Claudia Rankins
- Clytrice Watson

ENG

- Eduardo Misawa
- Paige Smith

GEO

- Brandon Jones
- Holly Barnard
- Bernard Grant

MPS

- Kathleen McCloud
- Guebre Tessema

OIA

- Randy Phelps
- Leah Nichols

SBE

- Kwabena Gyimah-Brempong
- Josie Welkom

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EiR Proposal Information

- **EiR is a track in the HBCU-UP solicitation (NSF 18-522)**
- **It is expected that there will be one competition per year in the future**
- **2 award types:**
  - **Single investigator projects – up to $500,000**
  - **Multi-investigator projects – up to $1M**

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EiR Proposal Information

SPRING 2018

- **January**

  445 Letters of Intent

- **March**

  242 proposals

FALL 2018

- **July 2018**

  236 Letters of Intent

- **October 2, 2018**

  142 proposals

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Awards: Directorate Distribution

Directorate	# Awards	Small Award	Large Award
BIO	7	4	3
CISE	5	2	3
EHR	2	2	
ENG	9	6	3
GEO	5	4	1
MPS	12	9	3
SBE	4	3	1
Grand Total	**47**	**30**	**14**

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Awards: Institutional Distribution

Institution	$$	# Awards
Alabama State University	$ 499,983	1
Clark Atlanta University	$ 499,511	1
Delaware State University	$ 498,372	1
Florida A&M University	$ 499,682	1
Howard University	$ 3,540,912	7
Jackson State University	$ 798,755	2
Morehouse College	$ 992,892	1
Morgan State University	$ 2,086,786	4
Norfolk State University	$ 1,949,313	3
North Carolina A&T State University	$ 3,070,855	5
North Carolina Central University	$ 2,984,930	4
Prairie View A&M University	$ 499,998	1
Spelman College	$ 2,274,763	5
Tennessee State University	$ 878,572	1
Texas Southern University	$ 1,240,466	3
Tuskegee University	$ 458,426	1
University of the Virgin Islands	$ 498,125	1
Winston-Salem State University	$ 1,062,471	3
Xavier University (LA)	$ 1,197,449	2
Grand Total	**$ 25,532,261**	**47**

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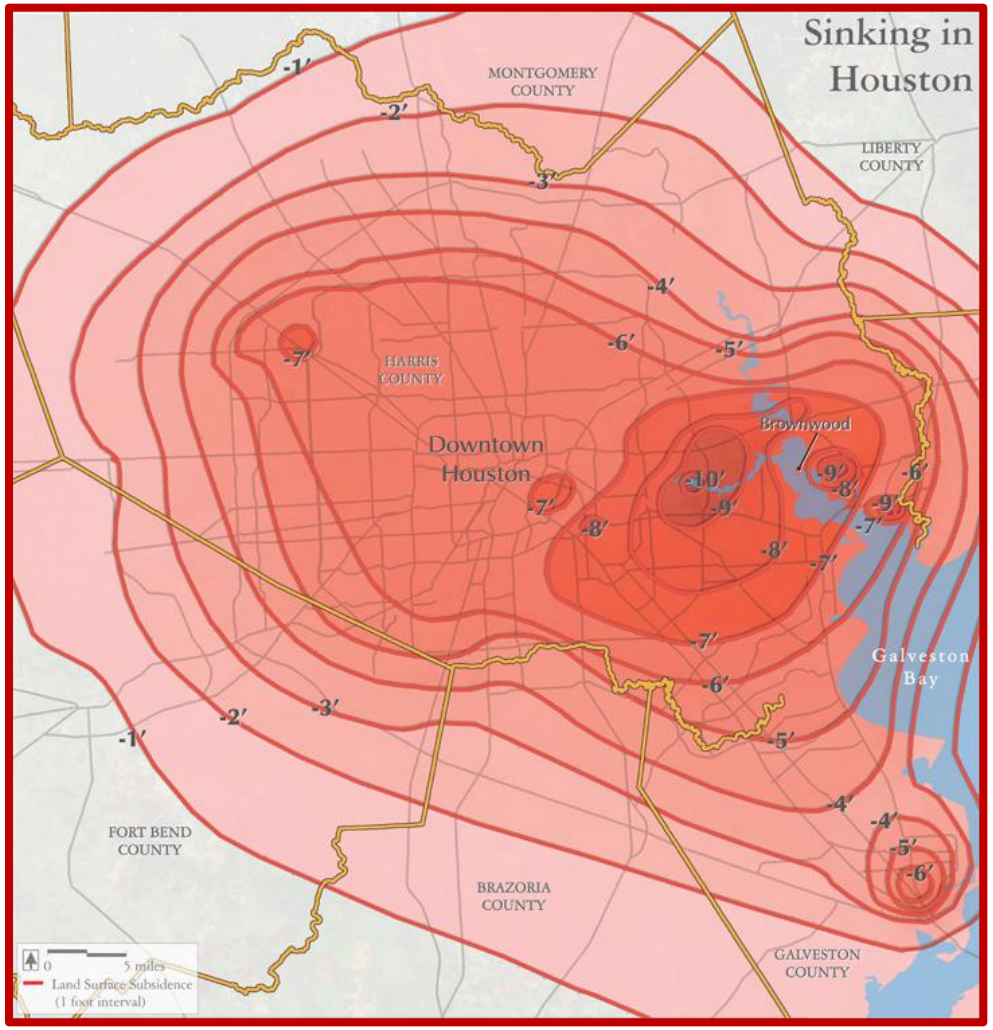
Small Award #1832065
$474,974
Morgan State University

Identification of Urban Flood Impacts Caused by Land Subsidence and Sea Level Rise for the Houston-Galveston Region



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Large Award #1831013
$1,000,000
North Carolina A&T University

Radiative Effects of Biomass Burning Aerosols Laboratory and Field Measurements and Modeling of Climate and Health Impacts

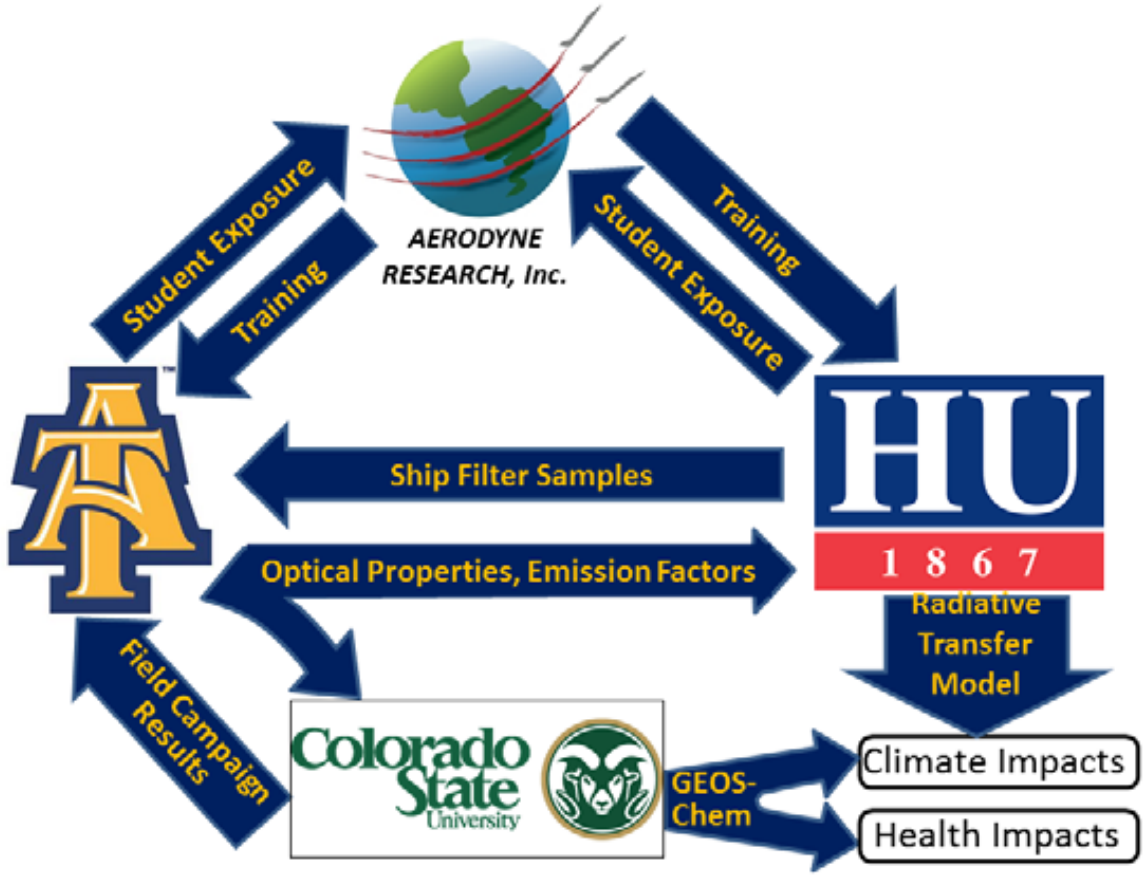

Figure 1. Schematics of the Collaboration

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Improving Undergraduate STEM Education: Hispanic-Serving Institutions

HSI PROGRAM UPDATE

Dr. Talitha Washington

Consolidated Appropriations Act, 2017

"The agreement also directs NSF to establish an Hispanic Serving Institution (HSI) program at no less than $15,000,000…to use this program to **build capacity at institutions of higher education that typically do not receive high levels of NSF grant funding."**

American Innovation and Competitiveness Act, P.L. 114-329

"The Director shall award grants on a competitive, merit-reviewed basis to Hispanic-serving institutions (as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a)) to **enhance the quality of undergraduate STEM education** at such institutions and to **increase the retention and graduation rates** of students pursuing **associate's or baccalaureate degrees** in science, technology, engineering, and mathematics.''

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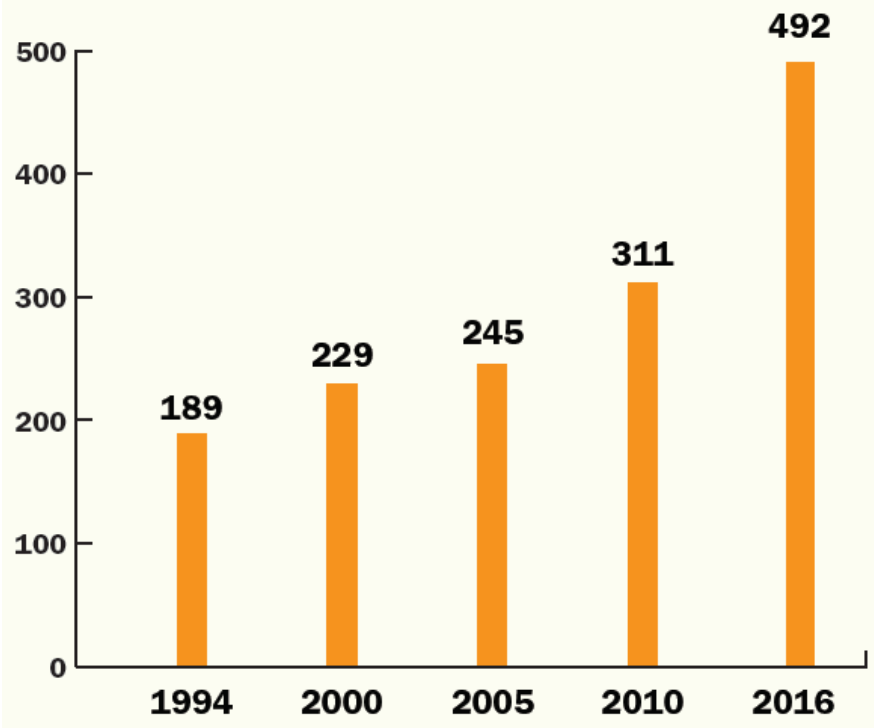
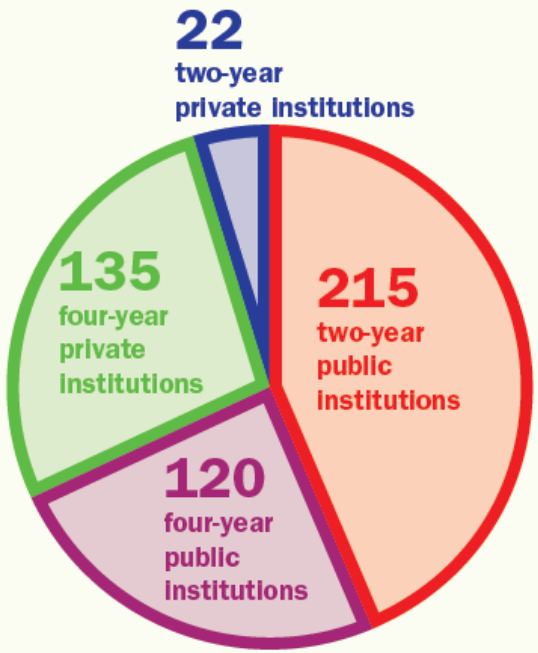
HSI Definition

- As specified in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a)
  - a) be an eligible institution
  - b) have a full-time equivalent enrollment of undergraduates that is at least 25% Hispanic.





2018 HACU Fact Sheet

HACU
HISPANIC ASSOCIATION OF COLLEGES & UNIVERSITIES

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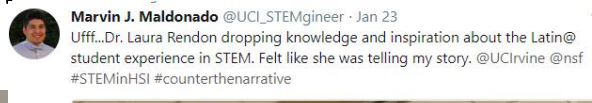
#STEMinHSI

Listening Sessions

- Subcommittee of the Advisory Committee of EHR
- Faculty and Staff Listening Sessions
- Student Listening Session at SACNAS
- HSI Conferences

Task: Identify critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs of higher education, and potential actionable solutions that fall within NSF's mission, policies, and practices



University of Puerto Rico Mayaguez

November 8-9, 2018 (1802552)

http://uprm.edu/hsi_innovation

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HSI CONFERENCE | INNOVATION ECOSYSTEMS

HOME SCHEDULE ACTIVITIES

NSF HSI Conference

Accelerating the Impact of HSI STEM Education and Research on Innovation Ecosystems

Hosted by the UPRM on November 8-9, 2018 at **Mayagüez Resort and Casino**

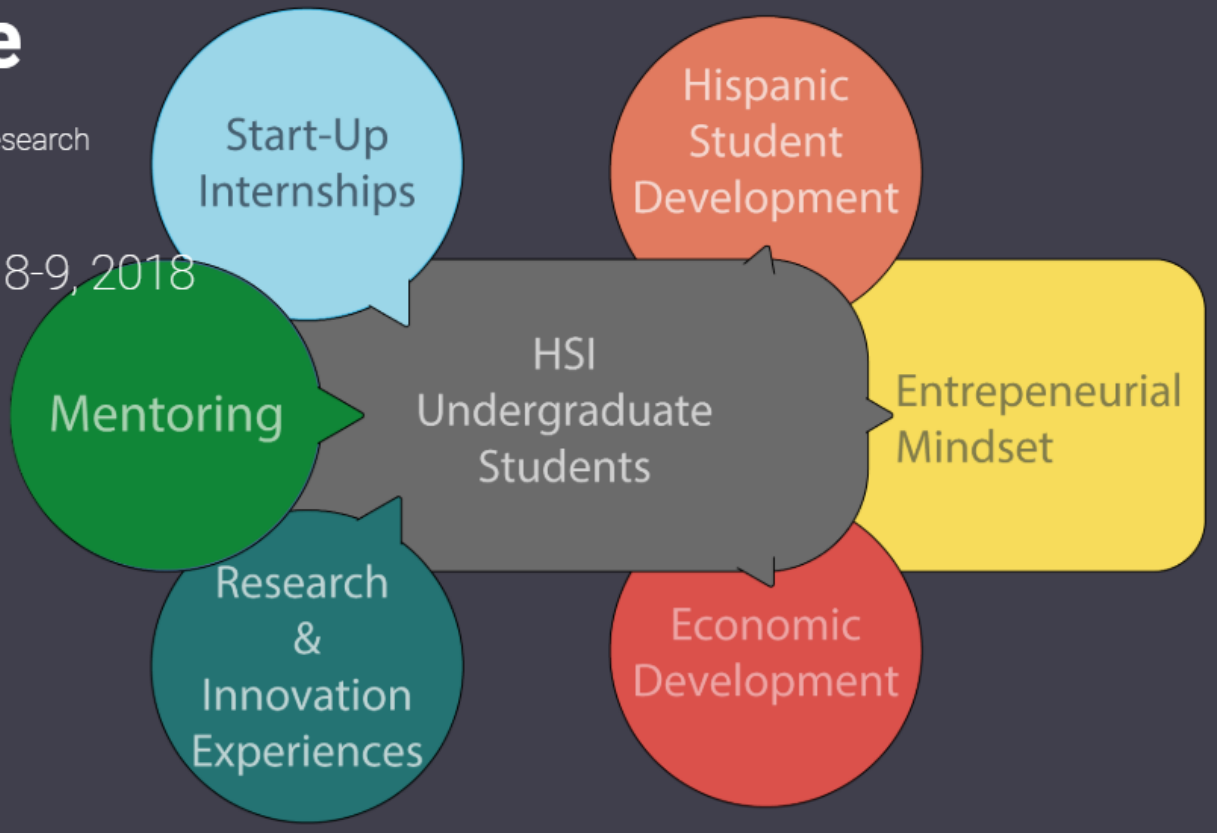
Google Calendar

hsi_innovation@uprm.edu

View Schedule

Submit Conference Paper

Register Here



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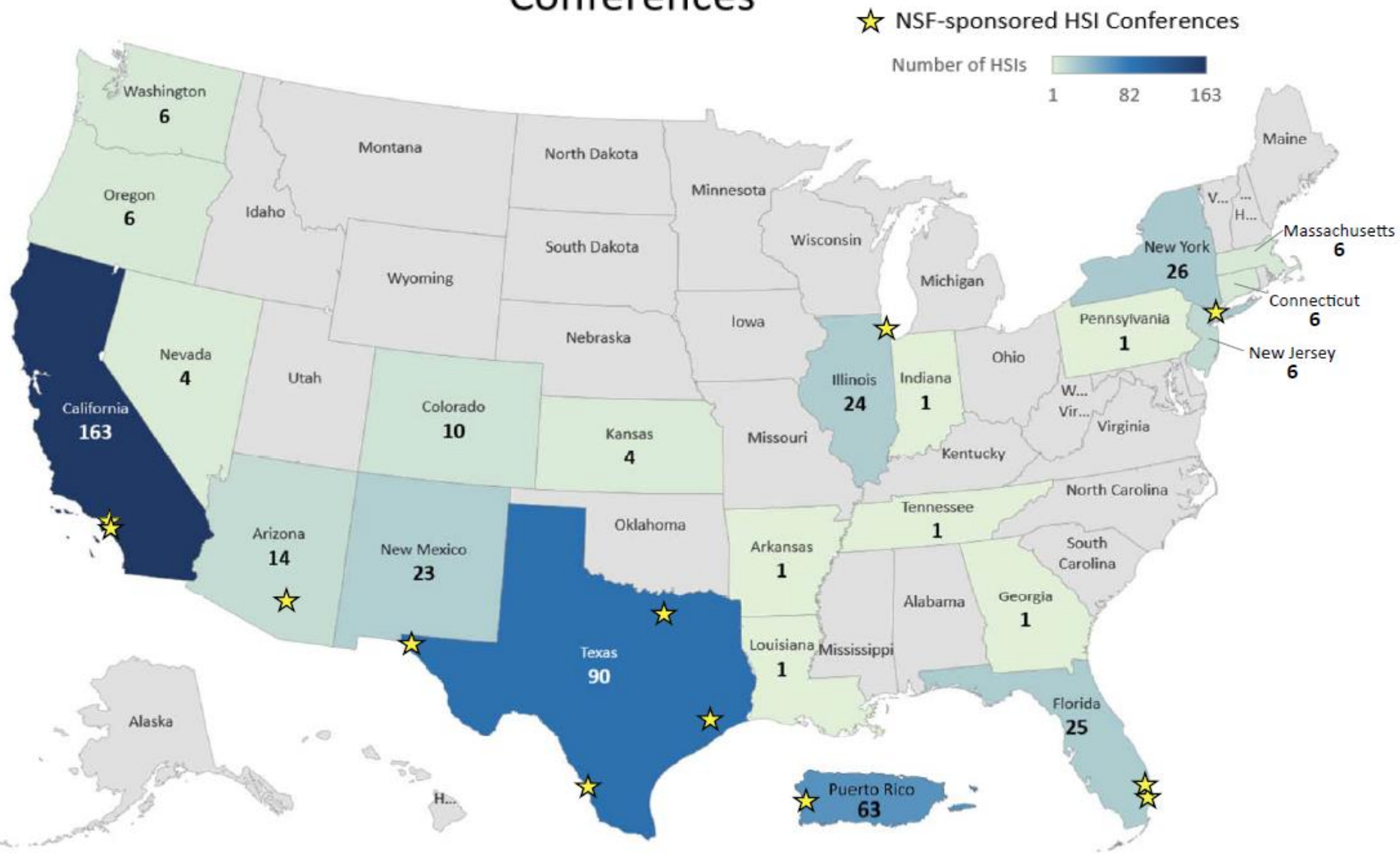
Number of HSIs by State and Location of NSF-sponsored HSI Conferences



Source: *Excelencia* in Education. (2018). Hispanic Serving Institutions (HSIs) 2016 -17. Washington, D.C.: *Excelencia in Education*.

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HACU Intern: Diana Hernandez

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Hispanic Association of Colleges and Universities

HACU 32nd Annual Conference

Championing Hispanic Higher Education Success: Building America's Future

Atlanta Marriott Marquis • Atlanta, GA • October 6-8, 2018

ATLANTA 2018

J.P. White of OIA, Talitha Washington, Alicia Diaz, HACU's Executive Director of Legislative Affairs, and Luis Maldonado, HACU's Chief Advocacy Officer

Dr. Antonio Flores, President & CEO of HACU, and Talitha Washington

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Some Recommendations from the Community

- Fine-tune the program as it progresses
- Possible areas to support
  - Faculty development, including culturally-based advising
  - Faculty release time
  - Paid undergraduate research opportunities early and often
  - Bridge programs that align student transitions among high school, two-year and four-year institutions
  - Creation of consortia among HSIs and between HSIs and industry *National Science Foundation*

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Establishing an HSI Program

- Hispanic-Serving Institution (HSI) Program (NSF 18-524) – March 6, 2018
- Goals for the program:
  - Build capacity at HSIs that typically do not receive high levels of NSF grant funding
  - Increase the retention and graduation rates of students pursuing associate's or baccalaureate degrees in STEM
  - Focus on undergraduate STEM education
- https://nsf.gov/ehr/HSIProgramPlan.jsp

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HSI Program, NSF 18-524

- Projects supported by the HSI Program are expected to **generate new knowledge** about **how** to enhance undergraduate STEM education that results in an increase in retention and graduation rates of undergraduate students pursuing STEM degrees at HSIs.
- Proposals should include the **question(s)** to be investigated, explain the **significance** of answering the proposed question(s), and discuss the **evidence or theory** that motivates the question(s).
- Each proposal should have clear project **goals**, measurable **objectives**, and **evaluation** activities aligned to the goals and objectives.

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HSI Program Overview

Track 1: Building Capacity

- Priority areas: Critical transitions, innovative cross-sector partnerships, and research on broadening participation
- Project length: Up to five years
- Award size: $500,000 to $1,500,000

Track 2: HSIs New to NSF

- Broaden the number of HSIs participating in NSF programs while implementing and adapting any of the priority areas in Track 1.
- Project length: Up to three years
- Award size: Up to $250,000

Resource Hub

- Facilitate networking and professional development that build and strengthen collaborations among HSIs.
- Project length: Up to five years
- Award size: Up to $3,000,000

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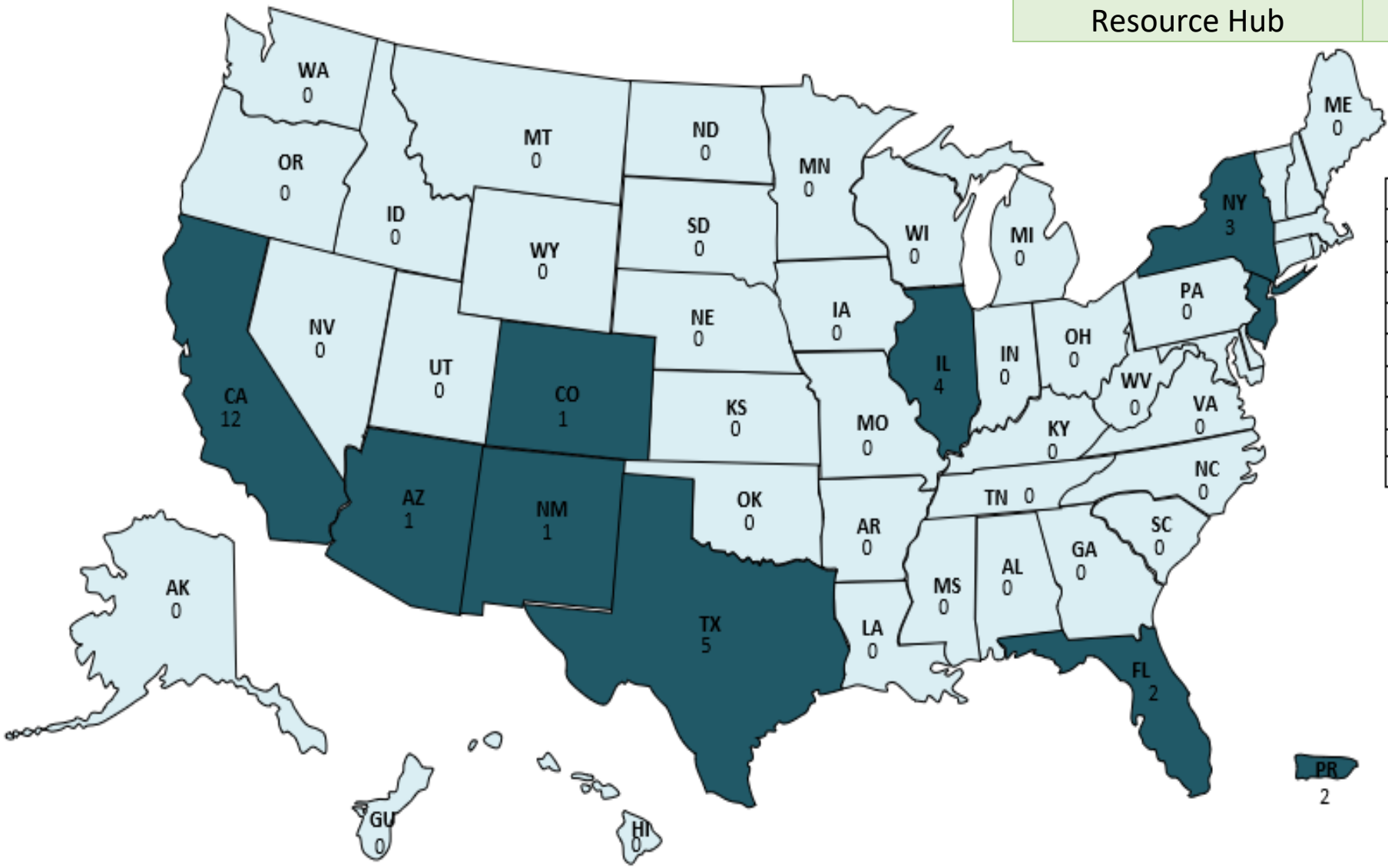
Awards FY18

Track	Awards
Track 1: Building Capacity	28
Track 2: HSI's New to NSF	3
Resource Hub	2



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Awards Made in FY18

- Awards were issued to 5 community colleges and 3 universities that have received little to no previous NSF funding

Conferences	$690,531
Track 1: Building Capacity	$38,237,769
Track 2: HSIs New to NSF	$749,371
Resource Hub	$3,000,000

- The HSI Program also co-funded 2 proposals from HSIs with the NSF INCLUDES and Accelerating Discovery programs

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Moving Forward

- Program Officers from DUE, HRD, and DRL work with the HSI Program
- Revising the next solicitation based on community input
- How much $$ will be available?
- Planning for the 2019 PI meeting for the new awardees
- Continue reaching out to institutions that have received little to no NSF funding
- Continually increase the impact of the program

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HSI Program https://nsf.gov/ehr/HSIProgramPlan.jsp

Ongoing Task: Identify critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs of higher education, and potential actionable solutions that fall within NSF's mission, policies, and practices

Questions?

Dr. Minerva Cordero
mcordero@nsf.gov

Dr. Talitha Washington
twashing@nsf.gov

NSF-EHR-HSI@nsf.gov

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Tribal Colleges and Universities Program (TCUP)

Jody Chase

Acting Deputy Division Director, Division of Human Resource Development

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TCUP…What's available?

NSF 18-546

- ICE-TI (our signature capacity-building track)
- TSIP (a limited version of ICE-TI)
- TEA Centers (links STEM to local needs)
- SGR (principally research)
- PAGE (promotes success in geosciences)
- PEEC (promotes success in engineering)
- PADLE (promotes success in linguistics)
- SEA-PHAGES in TCUs (with HHMI)
- Pre-TI (to develop a strategic plan)

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TCUP Partnerships

NSF 18-546

- Pre-Engineering Education Collaboratives (PEEC: promotes success in engineering)
- Partnerships for Geoscience Education (PAGE: promotes success in geosciences)
- Partnerships for Documentary Linguistics Education (PADLE: promotes success in linguistics)
- TCU Enterprise Advancement Centers (TEA Centers: links STEM to local needs)

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Partnerships start with…

“ We need to work together to accomplish something we can’t do separately.”

PEEC developed because leaders in ENG wanted to graduate more Native engineers. They put $1 million on the table. But the TCUP colleges did not offer baccalaureate degrees in engineering.

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Partnerships have to ask…

- "What can you do?"
- "What can I do?"

ENG could support faculty, students, and research.

TCUP could support TCUP institutions, but not mainstream universities.

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2013 Summer Engineering Experience 1 (SEE 1) students on a huakaʻi (excursion) to the Marine Education Training Center at Honolulu Community College learning about double hull canoe sailing and navigation. Photo credit: Arvin Niro

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Partnerships have to develop an operational model…

- A management plan details how the partnership will work. The solicitation announces that plan to the field.

TCUP manages the proposals for PEEC and PAGE.

DEL manages the proposals for PADLE.

TCUP supports the TCUP institutions.

ENG, GEO, and DEL support the mainstream institutions.

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Partnerships have to be realized in the field…

Collaborations between TCUP and Research Directorate leaders, based on a vision, lead to collaborations between TCUP institutions and mainstream universities.

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PAGE tweaked the PEEC model by including graduate work. The result: Bridging Shared Waters for Geoscience Studies

- 8 + year study of the phytoplankton dynamics in Bellingham Bay
- Monitoring the propagation and movement of low oxygen waters in Bellingham Bay
- Support tribal fisheries
  - Dungeness crab – 30-60% of income

Marco Hatch[1], Sheridan Nodestine[1], Ciara Asamoto[1], Robin Kodner[2] [1]NWIC, [2]WWU

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Partnerships' success depends on…

- Mutual respect
- Mutual results

In 2016, Gerald Henry was accepted into graduate school at the University of Arizona. He was NTU's first Electrical Engineering graduate.

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"The impact of this collaboration will be felt all throughout Native homelands as the leaders we are training work on real solutions that are culturally appropriate and scientifically valid."

-Marco Hatch, PhD (Samish)

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NTU's Electrical and Industrial Engineering programs **are ABET-accredited retroactively from October 1, 2015 until September 30, 2024**.

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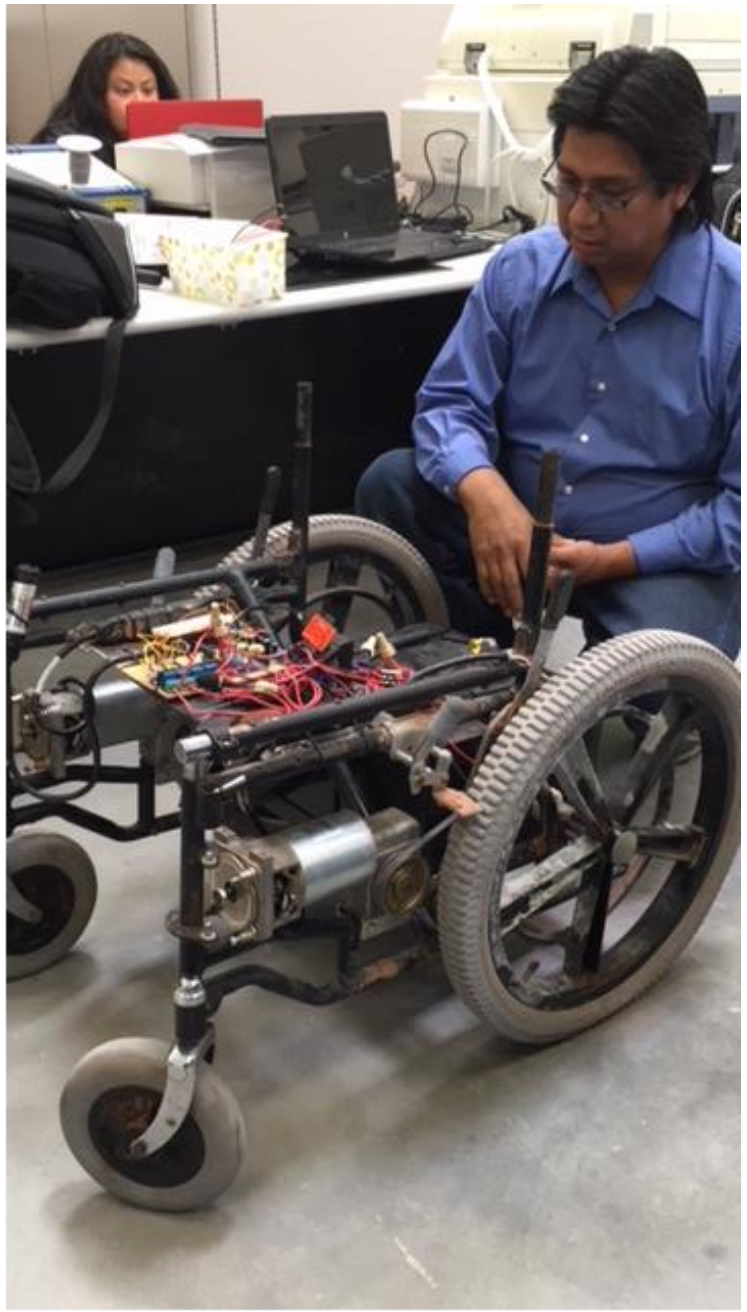
"Ericka Begody just accepted a job offer from the Air Force Research Lab in Rome, New York as an Electrical Engineer. She graduates this December. She will be attending Syracuse University to work on her masters and PhD. All paid for by the Air Force."

- Peter Romine, PhD



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TCU Enterprise Advancement Centers

- Allows the TCU to serve as a STEM partner to the tribe or local community, to address infrastructure, environmental, research, or education needs.
- Awards up to $3 million
- Awards up to 5 years, with the potential for renewal

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Margaret Mead:

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."

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Discussion questions

- What can the role NSF INCLUDES be with respect to other NSF and EHR programs that are well established?
- How might convergence research support broadening participation and institutional capacity for:
  - Low income/1st generation, racial/ethnic groups, immigrant status, veterans, people with disabilities, gender
  - And at the intersection of these groups?
- How can broadening participation be meaningfully incorporated in the EHR AC subcommittee themes, such as STEM Education of the Future and Public-Private Partnerships?
- Are there questions or comments about this session that you'd like to discuss with NSF leadership?

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Afternoon Break

3:30 – 3:45PM

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Prepare to Welcome

Dr. France A. Córdova

Dr. F. Fleming Crim

National Science Foundation

France Córdova, NSF Director
F. Fleming Crim, NSF Chief Operating Officer

EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez

EHR AC Chair

Chancellor
L.A. Community College District

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UPDATES

STEM Education Advisory Panel

Nafeesa Owens, Program Officer,
EHR Division of Human Resource Development

Federal STEM 5-year Strategic Plan (2018-2023)

Sylvia James, Acting Deputy Assistant Director, EHR

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STEM Education Advisory Panel Brief

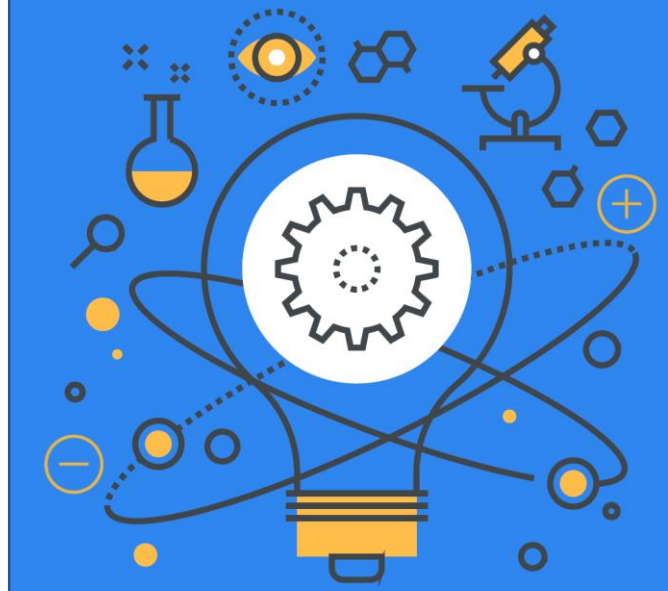
Nafeesa Owens, Ph.D.

Program Director, NSF

Liaison, Committee on STEM Education (CoSTEM)

Senior Advisor, Federal Coordination in STEM Education Subcommittee (FC-STEM)

Executive Secretary, STEM Education Advisory Panel



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History/Progress of STEM Education Advisory Panel

- American Innovation and Competitiveness Act (AICA) (Public Law 114-329; Jan 2017)
  - Directed four Federal agencies, NSF, NASA, ED, and NOAA, to form an advisory panel to:
    - advise the National Science and Technology Council (NSTC)'s Committee on STEM Education (CoSTEM),
    - assess CoSTEM's progress in carrying out its responsibilities, and
    - help identify need or opportunity to update the Federal STEM Education 5-year Strategic Plan.

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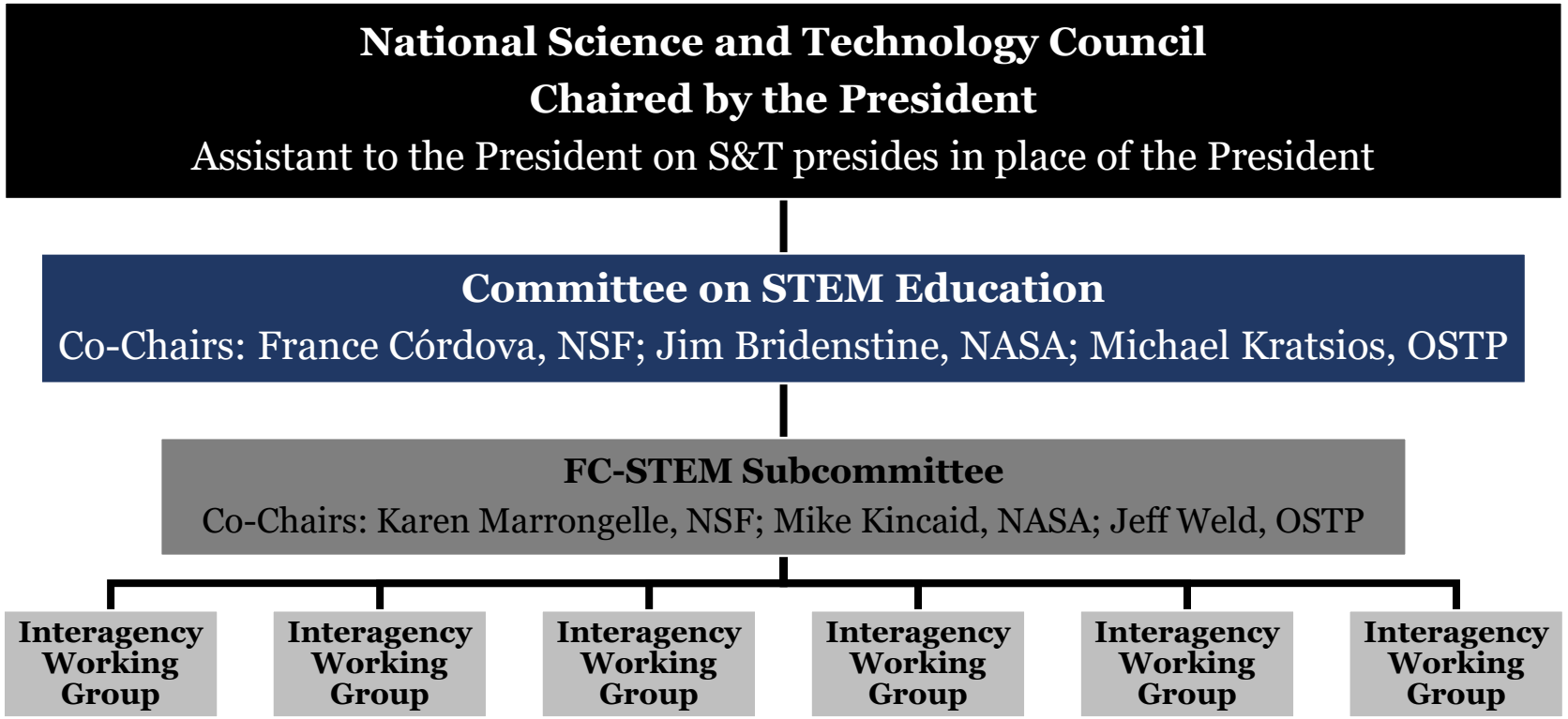
Introduction/Review of OSTP, NSTC, and CoSTEM



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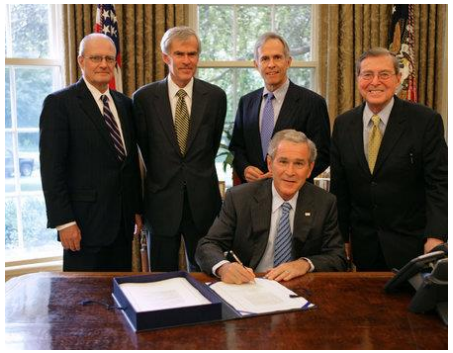
History of OSTP and NSTC

- The Office of Science and Technology Policy (OSTP) was officially established by Congressional act, *The National Science and Technology Policy, Organization, and Priorities Act of 1976.*



- The Act also established the Senate-confirmed position of OSTP Director, which has traditionally been a dual role along with Assistant to the President for Science and Technology.
- The National Science and Technology Council (NSTC) is a Cabinet-level council established by Executive Order in 1993 to coordinate science and technology policy across the executive branch.

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Executive Order 12881

The National Science and Technology Council (NSTC) was established to perform the following functions:

- To coordinate the science and technology policy-making process;
- To ensure that science and technology policy decisions and programs are consistent with the President's stated goals;
- To help integrate the President's science and technology policy agenda across the Federal Government;
- To ensure that science and technology are considered in the development and implementation of Federal policies and programs; and
- To further international cooperation in science and technology.

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NSTC Committees

The NSTC is comprised of the following **six committees** that are chaired by agencies and OSTP, with Office of Management and Budget (OMB) representation:

- Committee on Science
- Committee on Technology
- Committee on Homeland and National Security
- Committee on Environment
- Committee on S&T Enterprise
- **Committee on STEM Education**

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Introduction to Committee on STEM Education (CoSTEM)

- CoSTEM originally chartered in 2011 in alignment with the America COMPETES Reauthorization Act of 2010.
- Charged OSTP Director to establish a committee under NSTC.
- CoSTEM responsibilities include:
  - Advise NSTC on Federal priorities and plans, and recommend options for Federal priorities;
  - Review STEM education activities and programs, and the respective assessments of each, through the Federal agencies to ensure effectiveness; and
  - Direct, coordinate, and prioritize the work of its subcommittee(s) including overseeing the development of the Federal STEM Education 5-Year Strategic Plan.

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Introduction to Federal Coordination in STEM Education (FC-STEM)

- Subcommittee of CoSTEM
- Responsible for development and implementation of Federal STEM Education 5-Year Strategic Plan
  - Communication of priorities and activities across agencies
  - Development of implementation structure

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Members of CoSTEM and/or FC-STEM

- ***U.S. Department of Agriculture***
- ***U.S. Department of Health and Human Services***
- ***U.S. Department Of State***
- ***U.S. Department of Commerce***
- ***U.S. Department of Homeland Security***
- ***U.S. Department of Transportation***
- ***U.S. Department of Defense***
- ***U.S. Department of the Interior***
- ***U.S. Environmental Protection Agency***
- ***U.S. Department of Education***
- ***U.S. Department of Justice***
- ***Office of Science and Technology Policy, Executive Office of the President***
- ***U.S. Department of Energy***
- ***U.S. Department of Labor***
- ***National Aeronautics and Space Administration***
- ***National Science Foundation***
- ***Smithsonian Institution***

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CoSTEM, FC-STEM, and Advisory Panel Organization

National Science and Technology Council
Chaired by the President
Assistant to the President on S&T presides in place of the President

Committee on STEM Education
Co-Chairs: France Córdova, NSF; Jim Bridenstine, NASA; Michael Kratsios, OSTP

FC-STEM Subcommittee
Co-Chairs: Karen Marrongelle, NSF; Mike Kincaid, NASA; Jeff Weld, OSTP

- Interagency Working Group
- Interagency Working Group
- Interagency Working Group
- Interagency Working Group
- Interagency Working Group
- Interagency Working Group

STEM Education Advisory Panel

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History/Progress of STEM Education Advisory Panel

- In 2017, the panel was formally established as a chartered advisory committee (#2624) in accordance to the Federal Advisory Committee Act (FACA) of 1972 (Public Law 92-463).
- A request for nominations was made at the end of 2017
- Thousands of hits to website, hundreds of emails, and over 450 individual names were received from across the country

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Membership Criteria (from AICA)

Members shall:

- primarily be individuals from academic institutions, nonprofit organizations, and industry, including in-school, out-of-school, and informal education practitioners; and
- be individuals who are qualified to provide advice and information on STEM education research, development, training, implementation, interventions, professional development, or workforce needs or concerns.

A primary consideration: recognized knowledge, expertise, or demonstrated ability. Other factors: balance among diverse institutions, regions, and groups underrepresented in science, technology, engineering, and mathematics.

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Progress of STEM Education Advisory Panel

- Eighteen (18) members appointed to the panel and jointly announced by NSF, NOAA, ED, and NASA this summer.

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Members

- **Gabriela A. González, Panel Chair**
  Deputy Director of the Intel Foundation
  Intel Corporation
- **Vince M. Bertram, Ed.D., MBA**
  President and CEO
  Project Lead The Way
- **Douglas Clements, Ph.D.**
  Kennedy Endowed Chair in Early Childhood Learning, Executive Director of the Marsico Institute for Early Learning and Literacy, and Professor
  University of Denver
- **Lizanne DeStefano, Ph.D.**
  Professor, School of Psychology, Executive Director, CEISMC and Associate Dean, College of Sciences
  Georgia Institute of Technology

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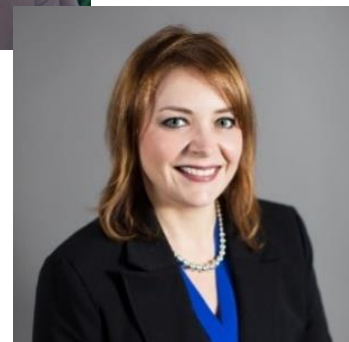
Members

- **Arthur Eisenkraft, Ph.D.**
  Distinguished Professor of Science Education and Director of the Center of Science and Math in Context (COSMIC)
  University of Massachusetts, Boston

- **David L. Evans, Ph.D.; Panel Vice Chair**
  Executive Director
  National Science Teachers Association

- **Jacqueline Huntoon, Ph.D.**
  Provost/Vice President for Academic Affairs
  Michigan Technological University
- **Aimee Kennedy, Ph.D.**
  Senior Vice President for Education, STEM Learning and Philanthropy
  Battelle



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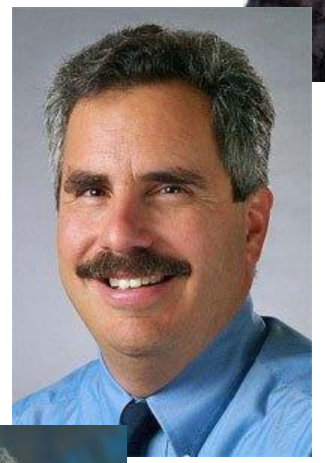
Members

- **Laurie Leshin, Ph.D.**
  President
  Worcester Polytechnic Institute
- **Robert D. Mathieu, Ph.D.**
  Albert E. Whitford Professor of Astronomy and Director of the Wisconsin Center for Education Research
  University of Wisconsin-Madison
- **Ray Mellado**
  Chairman of the Board and Founder
  Great Minds in STEM
- **Ioannis Miaoulis, Ph.D.**
  President and Director
  Museum of Science, Boston



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Members

- **K. Renae Pullen**
  K-6 Science Curriculum Instructional Specialist
  Caddo Parish Public Schools

- **Larry Robinson, Ph.D.**
  President and Director of NOAA's Center for Coastal and Marine Ecosystems
  Florida Agricultural and Mechanical University

- **Kimberly Scott, Ed.D.**
  Executive Director of the Center for Gender Equity in Science and Technology
  Arizona State University

- **Robert Semper, Ph.D.**
  Associate Executive Director
  Exploratorium

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Members

- **William Yslas Velez, Ph.D.**
  Emeritus Professor of Mathematics
  The University of Arizona
- **Bruce Wellman**
  Chemistry, Engineering, and Robotics Teacher
  Olathe Northwest High School

Full Bios cab be found at:
https://nsf.gov/ehr/STEMEdAdvisory.jsp

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Progress of STEM Education Advisory Panel

- In August, members attended a 2-hour virtual orientation
- In September, a one-day in-person inaugural meeting
  - The meeting was partially closed to the public; members discussed an internal government report that was/is not open for public review or comment.

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Additional Guests at Inaugural Meeting

- **France A. Córdova, Ph.D.**
  Director, NSF
  Co-Chair, Committee on STEM Education (CoSTEM)

- **Jim Bridenstine**
  Administrator, NASA
  Co-Chair, CoSTEM

- **Mike Kincaid**
  Associate Administrator for Office of STEM Engagement, NASA
  Co-Chair, Federal Coordination in STEM Education Subcommittee (FC-STEM)

- **Sylvia James, Ed.D.**
  Acting Deputy Assistant Director, Directorate for Education and Human Resources, NSF;
  Acting Co-Chair, FC-STEM (until 10/10/18)

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Additional Guests at Inaugural Meeting

- **Jeff Weld, Ph.D.**
  Senior Policy Advisor and Assistant Director, STEM Education, OSTP
  Co-Chair, FC-STEM

- **Chloe Kontos**
  Executive Director, National Science and Technology Council (NSTC), OSTP

- **William (Jim) Lewis, Ph.D.**
  Acting Assistant Director (until 9/30/18), Directorate for Education and Human Resources, NSF

- **F. Fleming Crim, Ph.D.**
  Chief Operating Officer, NSF

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Inaugural Meeting

Open Session - Agenda for the Year

Subcommittee Ideas

- Assessment of Diversity, Inclusion, and Persistence in STEM
- Criteria and Methodology to evaluate effectiveness of federal STEM programs
- “Best” Practices; Public Sharing/ Dissemination

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Federal STEM Education 5-year Strategic Plan (2018-2023)

Sylvia James
Acting Deputy Assistant Director, EHR

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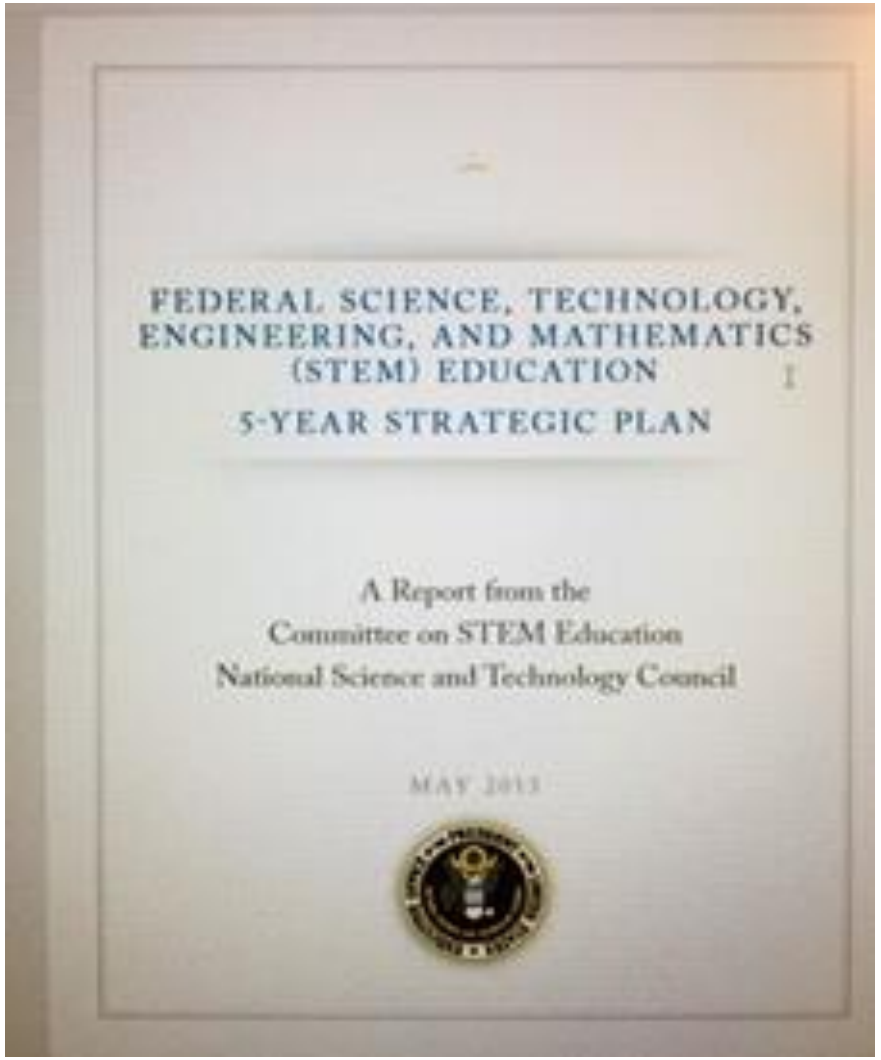
Federal STEM Education 5-Year Strategic Plan 2013-2018

In response to the America COMPETES Reauthorization Act of 2010, the *Committee on STEM Education (CoSTEM)* chartered the **Federal Coordination in STEM Education (FC-STEM) Task Force** to develop a five-year strategic plan with CoSTEM oversight.



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Federal STEM Education 5-Year Strategic Plan 2013-2018:

- included five priority STEM education investment areas that Federal agencies would work together to address (*Undergrad, Grad, PreK12, BP, Engagement*);
- two coordination objectives (*build models & evidence-based approaches*)
- a sixth priority area, Computer Science for All, was added in 2016
- Interagency Working Groups (IWGs) were established to coordinate the approaches to each of the priorities
- The final report on the 2013-2018 plan was submitted to OMB and the GAO report on the success of the plan was released in March, 2018.

Federal STEM Education 5-Year Strategic Plan 2013-2018

The production of a Federal STEM Education 5-Year Strategic Plan strategic plan for 2018-2023 is under way, led by Dr. Jeffrey Weld, Senior Policy Advisor, OSTP. It includes input from a wide range of stakeholders, including

- participants at the White House 2018 State-Federal STEM Education Summit
- Federal science agencies as writers, FC-STEM members, and CoSTEM

All information about the plan is embargoed until its official release, expected by the end of 2018.

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Updates in Briefing Book

- Update on NSF's Harassment Policy
- EHR Committee of Visitors
- National Academy of Sciences Consensus Study Report "English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives"
- The NSF 2026 Idea Machine

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NSF Response Processes to the National Academies of Science, Engineering, and Medicine Report, "Graduate STEM Education for the 21st Century"

Moderator: Charisse Carney-Nunes

Acting Deputy Division Director, Division of Graduate Education (DGE)

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Opportunity for Engagement: *Graduate STEM Education for the 21st Century*

Nimmi Kannankutty
Division of Graduate Education
Division Director (Acting)
October 19, 2018

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Opportunity for Engagement: *Graduate STEM Education for the 21st Century*

Nimmi Kannankutty
Division of Graduate Education
Division Director (Acting)
October 19, 2018

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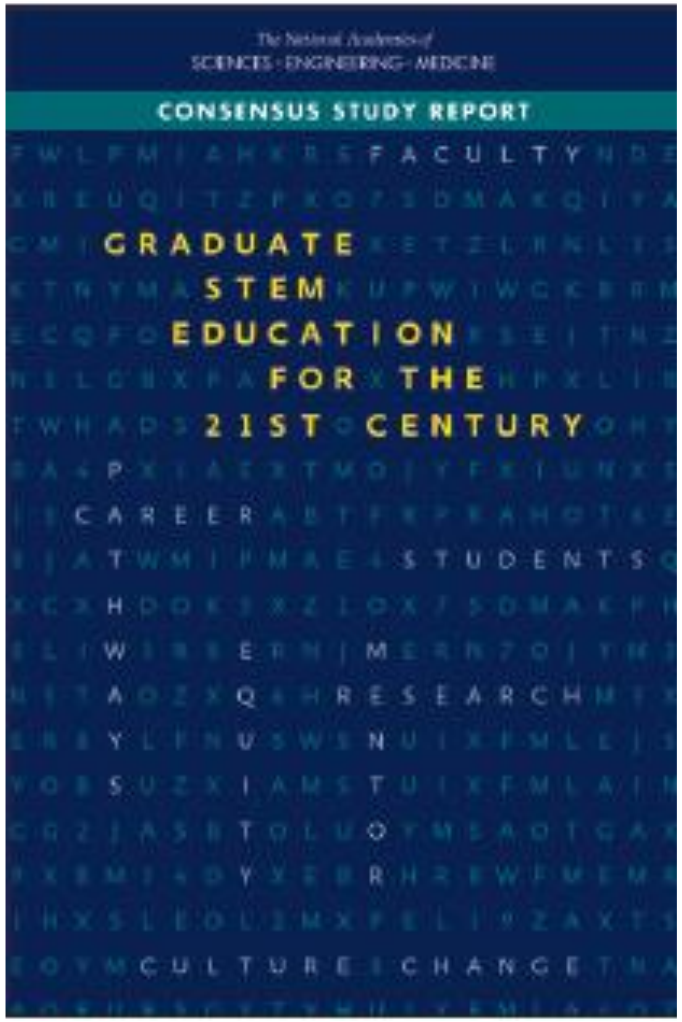
NASEM Report Outcome and Features

Outcomes

- Affirmation that the strength of US STEM graduate education "gold standard"
- Adaptation needed to address emerging needs

Features

- Statement of themes for improving STEM graduate education
- Features of an "ideal" STEM graduate education
- Key recommendations by stakeholder group



The National Academies of Sciences, Engineering and Medicine. 2018

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Themes for Improvement of STEM Graduate Education

common to master's and doctoral education

1. Adaptability
2. Core Competencies

Institutional change and educational improvement

3. Diversity, Equity and Inclusiveness
4. Optimize Student Experience
5. Teaching and Mentoring

Improved learning environment

6. Career Exploration
7. Data Transparency

Informed decision-making

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An "ideal" STEM graduate education

shift to a student-centered focus

- Technical literacy with deep specialization in area of interest
- Broad scientific context and skillsets to work across areas
- Communication training
- Rich learning experiences: Project-based, team learning
- Career exploration opportunities
- Inclusive, equitable learning environments
- Effective advising/mentoring
- Channels for student voices to inform graduate education
- Data transparency

π – Shaped Training

- NRT
- 2016 APG Grad Ed
- INTERN

Improved learning environment

- NSF INCLUDES

Informed decision-making

- EAC/NCSES
- ECR

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Report Recommendations for Federal/State Funding Agencies

1. Support research on the graduate education system, interventions and policies, and outcomes of funding mechanisms
2. Support research on adapting the graduate education enterprise to the changing nature of science
3. Require data collection on graduate students (long-term outcomes); provide this data in proposals for traineeships, fellowships, research assistantships
4. Align policies and award criteria to ensure an "Ideal" graduate education
5. Incentivize diversity, equity and inclusion metrics in funding criteria; include accountability in reporting mechanisms
6. Require Individual Development Plans (IDPs) for graduate students; update annually

Research

- Institutional change and educational improvement
- Improved learning environment

Policy Changes

- Informed decision-making

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Responding to the Recommendations

Input from three groups of stakeholders:

1. Subcommittee of the EHR Advisory Committee
   Dr. Strutchens

2. NSF Program Officer Working Group
   Dr. Easter

3. Division of Graduate Education

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Update from an NSF-Wide Program Officer Committee

Earnestine Easter

Program Director, EHR Division of Graduate Education

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Update from the EHR Advisory Committee Subcommittee on Graduate Education

Marilyn Strutchens

Emily R. & Gerald S. Leischuck Endowed Professor
Mildred Cheshire Fraley Distinguished Professor, Auburn University and Chair, EHR AC Subcommittee on Graduate Education

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Response to Recommendations

Graduate STEM Education for the 21st Century
The National Academies, 2018

EHR AC Subcommittee

AC Graduate Subcommittee Members

Dir/Office	Name
BIO	Carla Caceres
CISE	Bobby Schnabel
ENG	Greg Washington
GEO	Pamela Kempton
SBE	Ken Bollen
MPS	Miguel Garcia-Garibay
OIA-CEOSE	Suzanne Barbour
OIA-AC-ERE	Julia Parrish
OISE	Caroline Wagner
EH.R	Jim Spillane
EH.R (Chair)	Marilyn Strutchens

NSF Support Staff

- William Lewis
- Ernestine Easter
- Nirmala Kannankutty
- Andrea Watkins

Charge

The Subcommittee is charged to review the NASEM Graduate Education for the 21st Century Consensus Study Report, paying particular attention to the recommendations for Federal funding agencies and to offer their advice and recommendations as to how NSF should respond to the report. The subcommittee should deliver its report to the EHR AD and the Chair of the EHR Advisory committee. After review and acceptance by the EHR AC, the report will be presented to the NSF Assistant Directors for their review and possible action.

Updates

- We met for an hour on October 1, 2018
  - Got Acquainted with each other.
  - Brainstormed initial thoughts about the six recommendations.
  - Decided to divide the six recommendations so that we can focus more deeply on each one.
  - We will discuss our responses in more detail on October 24, 2018.
  - We have scheduled another meeting for October 29, 2018 to begin shoring up our ideas and plan for another meeting if necessary to complete the work.

Discussion Questions

- After hearing the background of the report and our subcommittee's charge what recommendations do you have for us as we move toward addressing our task?

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Questions and Comments

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Break

10:00 – 10:15AM

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EHR Program Highlights

Moderator: Elizabeth VanderPutten

Deputy Division Director, EHR Division of Research on Learning in Formal and Informal Settings

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EHR-wide: EHR Core Research

Sarah-Kay McDonald
Senior Advisor, EHR office of the Assistant Director

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EHR Core Research (ECR)

Session 7, EHR AC meeting — Friday October 19, 2018

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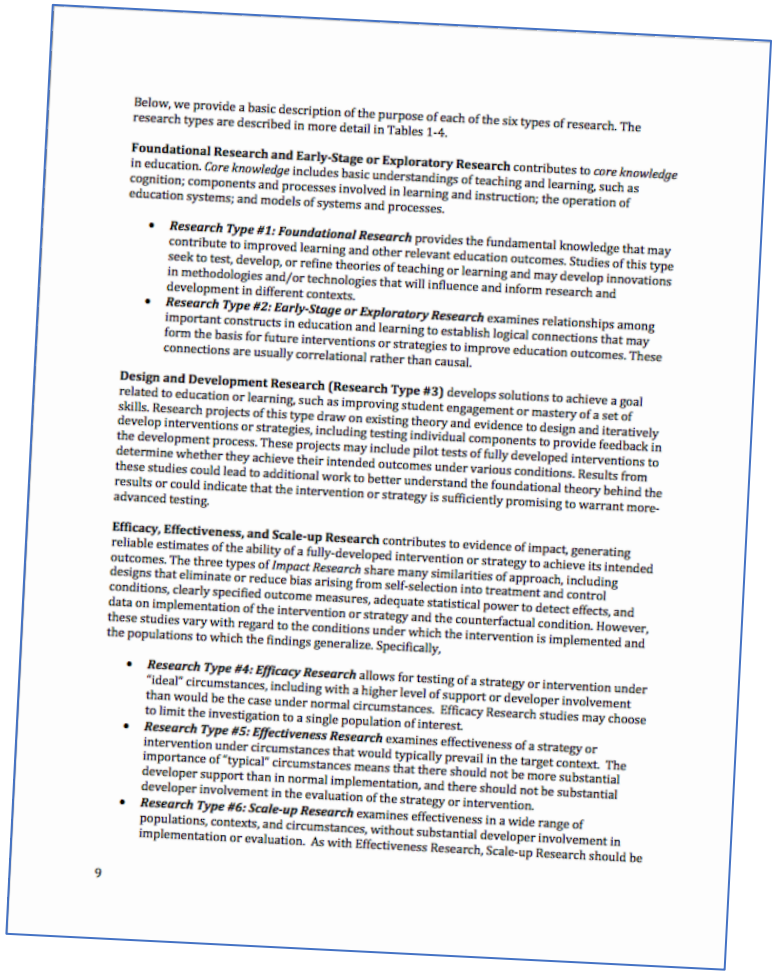
EHR Core Research (ECR) Program

- Since 2013, EHR has supported **fundamental research** in science, technology, engineering, and mathematics (STEM) education through the ECR program.
- ECR projects typically align with two genres of research described in the ***Common Guidelines for Education Research and Development*** **(NSF 13-126)**: foundational research, and early-stage or exploratory research.



Below, we provide a basic description of the purpose of each of the six types of research. The research types are described in more detail in Tables 1-4.

Foundational Research and Early-Stage or Exploratory Research contributes to *core knowledge* in education. *Core knowledge* includes basic understandings of teaching and learning, such as cognition; components and processes involved in learning and instruction; the operation of education systems; and models of systems and processes.

- ***Research Type #1: Foundational Research*** provides the fundamental knowledge that may contribute to improved learning and other relevant education outcomes. Studies of this type seek to test, develop, or refine theories of teaching or learning and may develop innovations in methodologies and/or technologies that will influence and inform research and development in different contexts.
- ***Research Type #2: Early-Stage or Exploratory Research*** examines relationships among important constructs in education and learning to establish logical connections that may form the basis for future interventions or strategies to improve education outcomes. These connections are usually correlational rather than causal.

Design and Development Research (Research Type #3) develops solutions to achieve a goal related to education or learning, such as improving student engagement or mastery of a set of skills. Research projects of this type draw on existing theory and evidence to design and iteratively develop interventions or strategies, including testing individual components to provide feedback in the development process. These projects may include pilot tests of fully developed interventions to determine whether they achieve their intended outcomes under various conditions. Results from these studies could lead to additional work to better understand the foundational theory behind the results or could indicate that the intervention or strategy is sufficiently promising to warrant more-advanced testing.

Efficacy, Effectiveness, and Scale-up Research contributes to evidence of impact, generating reliable estimates of the ability of a fully-developed intervention or strategy to achieve its intended outcomes. The three types of *Impact Research* share many similarities of approach, including designs that eliminate or reduce bias arising from self-selection into treatment and control conditions, clearly specified outcome measures, adequate statistical power to detect effects, and data on implementation of the intervention or strategy and the counterfactual condition. However, these studies vary with regard to the conditions under which the intervention is implemented and the populations to which the findings generalize. Specifically,

- ***Research Type #4: Efficacy Research*** allows for testing of a strategy or intervention under "ideal" circumstances, including with a higher level of support or developer involvement than would be the case under normal circumstances. Efficacy Research studies may choose to limit the investigation to a single population of interest.
- ***Research Type #5: Effectiveness Research*** examines effectiveness of a strategy or intervention under circumstances that would typically prevail in the target context. The importance of "typical" circumstances means that there should not be more substantial developer support than in normal implementation, and there should not be substantial developer involvement in the evaluation of the strategy or intervention.
- ***Research Type #6: Scale-up Research*** examines effectiveness in a wide range of populations, contexts, and circumstances, without substantial developer involvement in implementation or evaluation. As with Effectiveness Research, Scale-up Research should be

9

https://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf

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Program goals

- At the program level, ECR emphasizes the accumulation of robust evidence that informs efforts to understand, build theory to explain, & suggest interventions (& innovations) to address persistent challenges in STEM interest, education, learning, and participation.

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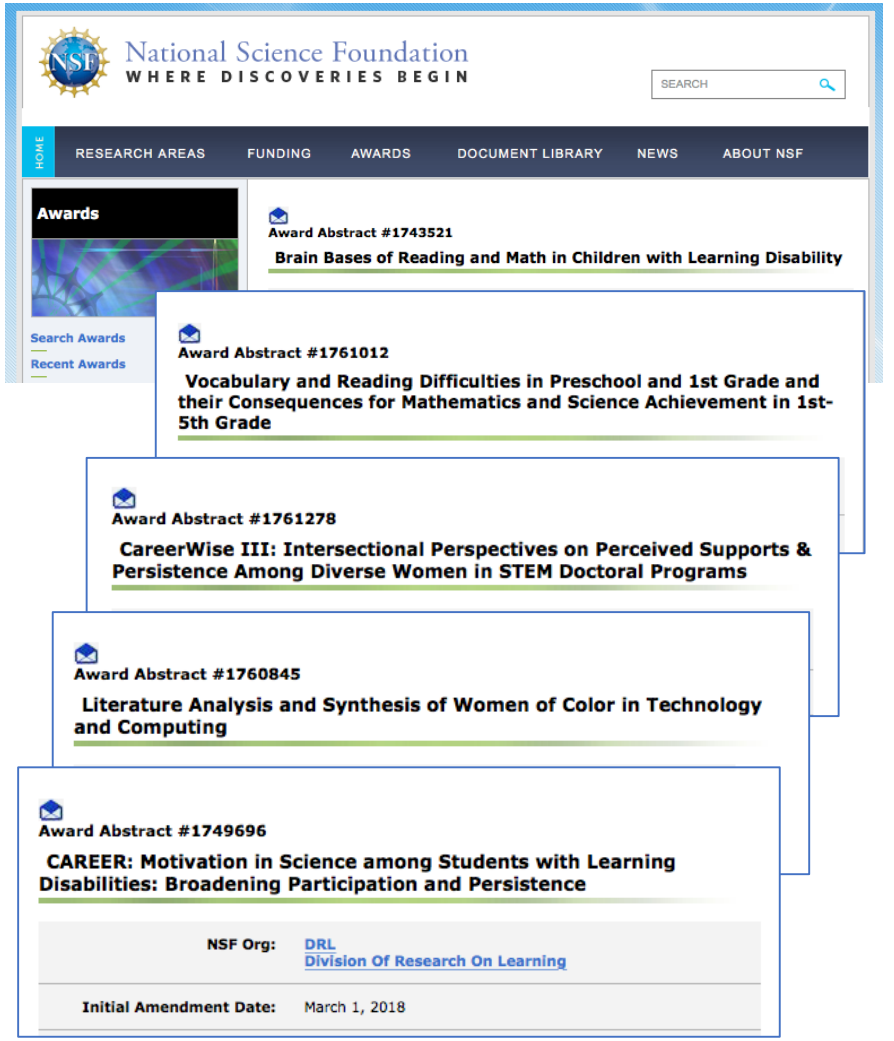
Broadening Participation & Institutional Capacity

Recent ECR awards address…

- Neurobiological underpinnings of math and reading disabilities
- Inter-relations among oral vocabulary, reading, mathematics & science difficulties throughout elementary grades
- Associations between perceived supports & persistence for majority and underrepresented minority women in STEM doctoral programs
- Factors that impact interest, participation, retention, & success of women of color in computing & technology fields
- Relationships between motivational beliefs of HS students with learning disabilities, & pursuit of advanced science coursework & careers



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Broad scope of inquiry

- **Broadening participation** in STEM, STEM **learning and learning environments**, and STEM **professional workforce development**
- **Proposals may include/involve:**
  - all learners, across the life course (e.g., all levels of education)
  - all settings (e.g., formal, informal, technological)
  - methodological innovations, including assessments of learning
  - career pathways & transitions; emerging practices, changing contexts & workforce needs
  - learning, persistence of groups, and underrepresentation in STEM fields
  - theory, techniques, perspectives from wide range of disciplines & contexts

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Program goals

- At the program level, ECR emphasizes the accumulation of robust evidence that informs efforts to understand, build theory to explain, & suggest interventions (& innovations) to address persistent challenges in STEM interest, education, learning, and participation.

CONSIDER

- **Connections with other EHR programs**
- **Implications for monitoring, evaluating progress**

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ECR: *WATCH FOR UPDATES*

- A new funding opportunity announcement is forthcoming:

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504924

- ECR@nsf.gov

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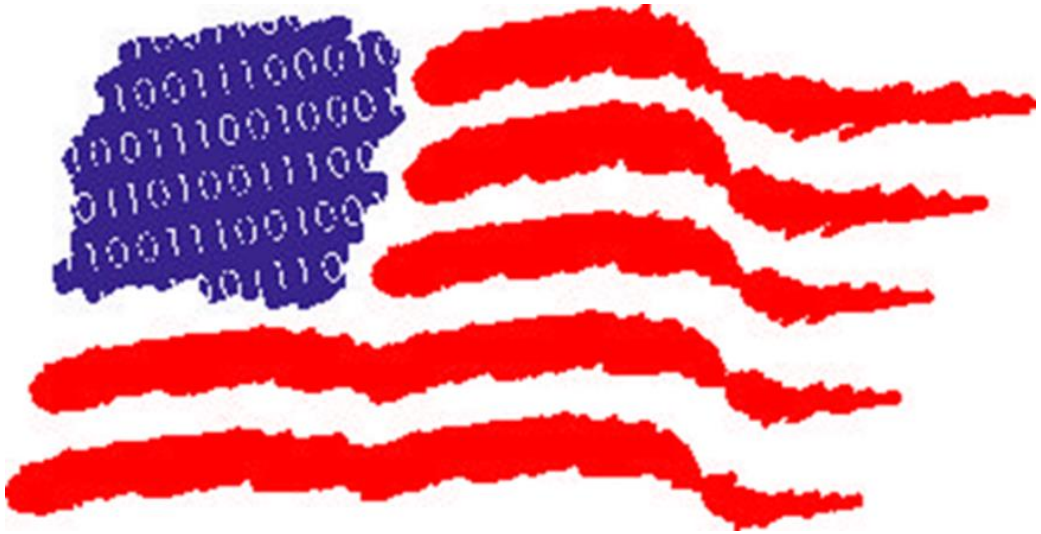
CyberCorps® Scholarship For Service (SFS)
Secure and Trustworthy Cyberspace (SaTC) - Education



Victor Piotrowski
CyberCorps SFS Lead
Division of Graduate Education

National Science Foundation

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CyberCorps® SFS Scholarships

- Scholarship grants support students earning degrees in cybersecurity in exchange for commitment to work for a federal, state, local, or tribal government agency after graduation.
- First cohort of 9 students entered the Federal workforce in 2002.
- As of January 2018, over 3,300 scholarships have been awarded since 2001 and currently there are 70 participating universities with about 720 students in school.

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CyberCorps® SFS Scholarships

- Full tuition, fees plus stipends ($22.5-34K per year) for up to 3 years of study
- Managed by NSF in collaboration with OPM and DHS
- Approximately 26% of graduates go to NSA and 20% to other DoD agencies (Air Force, Army, Navy, DISA, etc.)
- About 62% at the master's level; 33% undergraduates; 6% served in the Military
- Over 94% success rate

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CyberCorps® SFS - Building National Capacity

- **Capacity** grants support innovative approaches leading to an increase in the ability of the United States higher education enterprise to produce cybersecurity professionals.
- The **Federal Cybersecurity R&D Strategic Plan** underscores the need for research in cybersecurity education to satisfy the present and future workforce demands for qualified cybersecurity professionals.
- SFS contributes to multi-agency efforts of the **National Initiative for Cybersecurity Education (NICE)** program.

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Secure and Trustworthy Cyberspace (SaTC) Education Designation

- Aims to support fundamental scientific advances and technologies to protect cyber-systems from malicious behavior, while preserving privacy and promoting usability
- Proposal designations:
  - **Core**
  - **Education (EDU)**
  - **Transition to Practice (TTP)**
- Cross-Directorate and Industry Partner Solicitation: NSF CISE, EHR, ENG, MPS, and SBE with Semiconductor Research Corporation

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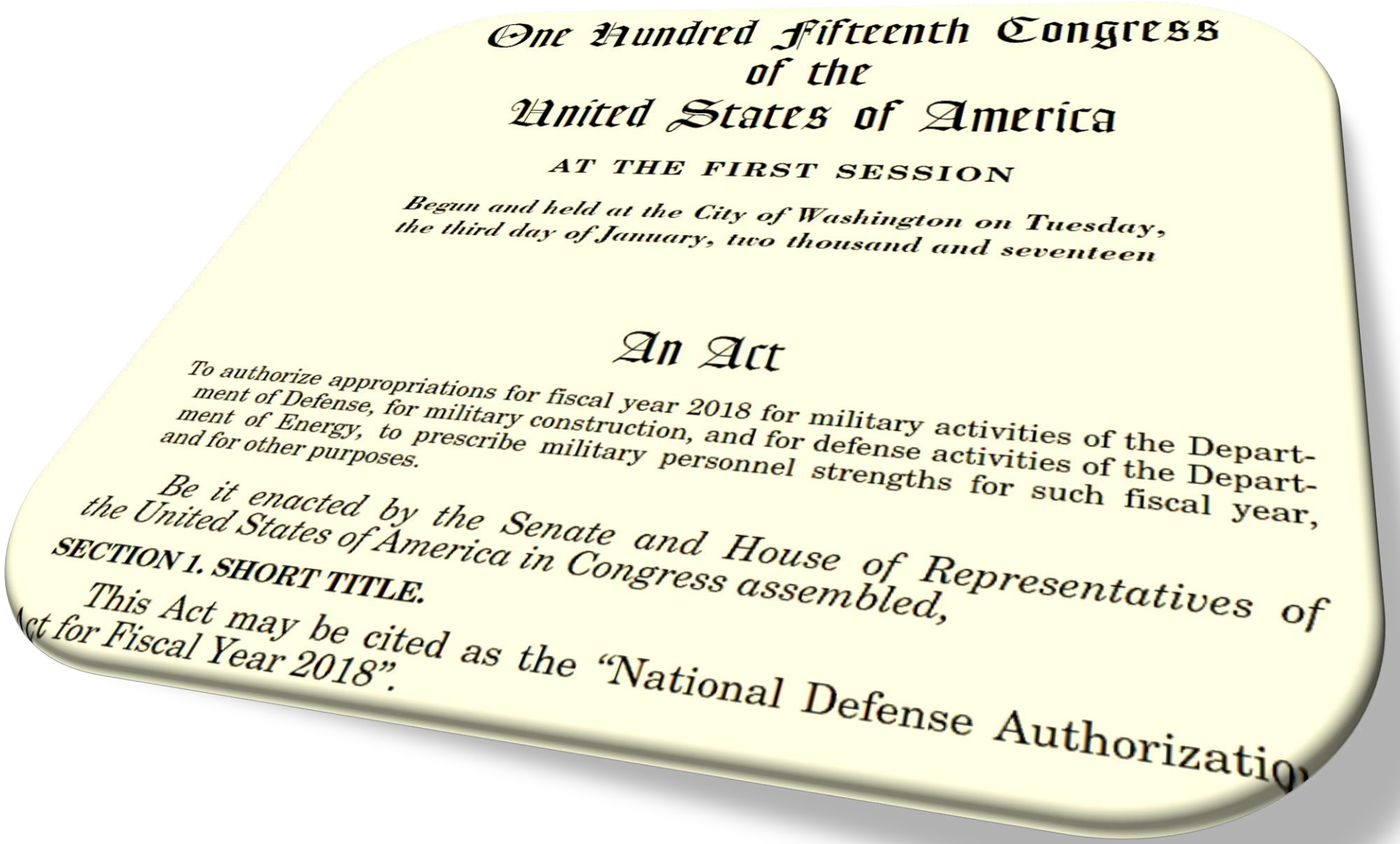

One Hundred Fifteenth Congress
of the
United States of America

AT THE FIRST SESSION

Begun and held at the City of Washington on Tuesday, the third day of January, two thousand and seventeen

An Act

To authorize appropriations for fiscal year 2018 for military activities of the Department of Defense, for military construction, and for defense activities of the Department of Energy, to prescribe military personnel strengths for such fiscal year, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Defense Authorization Act for Fiscal Year 2018".

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NDAA 2018
COMMUNITY COLLEGE CYBER PILOT (C3P) PROGRAM

Pilot Program.--Not later than 1 year after the date of enactment of this subtitle, as part of the Federal Cyber Scholarship-for-Service program established under section 302 of the Cybersecurity Enhancement Act of 2014 (15 U.S.C. 7442), the Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall develop and implement a pilot program at not more than 10, but at least 5, community colleges **to provide scholarships to eligible students who—**

(1) are pursuing associate degrees or specialized program certifications in the field of cybersecurity; and

(2)(A) have bachelor's degrees; or (B) are veterans of the Armed Forces.

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NDAA 2018
K-12 Cybersecurity Education

(…) provide awards to **improve cybersecurity education at the kindergarten through grade 12 level**—

(A) to increase interest in cybersecurity careers;
(B) to help students practice correct and safe online behavior and understand the foundational principles of cybersecurity;
(C) to improve teaching methods for delivering cybersecurity content for kindergarten through grade 12 computer science curricula; and
(D) to promote teacher recruitment in the field of cybersecurity.

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National Capacity - GenCyber

Summer 2018

- 150 GenCyber camps in 43 states, DC and PR
- 82 hosting institutions
- 4,123 students and 1,156 teachers participated
- female students - 48%; teachers - 68%
- ethnic/racial diversity of students – 44%; teachers – 32%

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National Capacity

Women in CYBER SECURITY

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A Snapshot of the Robert Noyce Teacher Scholarship Program

Sandra Richardson, Noyce Program Lead

Division of Undergraduate Education

National Science Foundation

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Track 1: S&S

Scholarships & Stipends

for

Undergraduate STEM majors and professionals

Track 2: TF

NSF Teaching Fellowships

for

STEM professionals

Robert Noyce Teacher Scholarship Program

Track 3: MTF

Master Teaching Fellowships

for

Exemplary, experienced STEM teachers

Track 4: Noyce Research

for

Research related to STEM teacher effectiveness, persistence, and retention in high-need districts

*Capacity Building projects, which may lead to the development of full proposals for Tracks 1, 2, or 3, are also supported.

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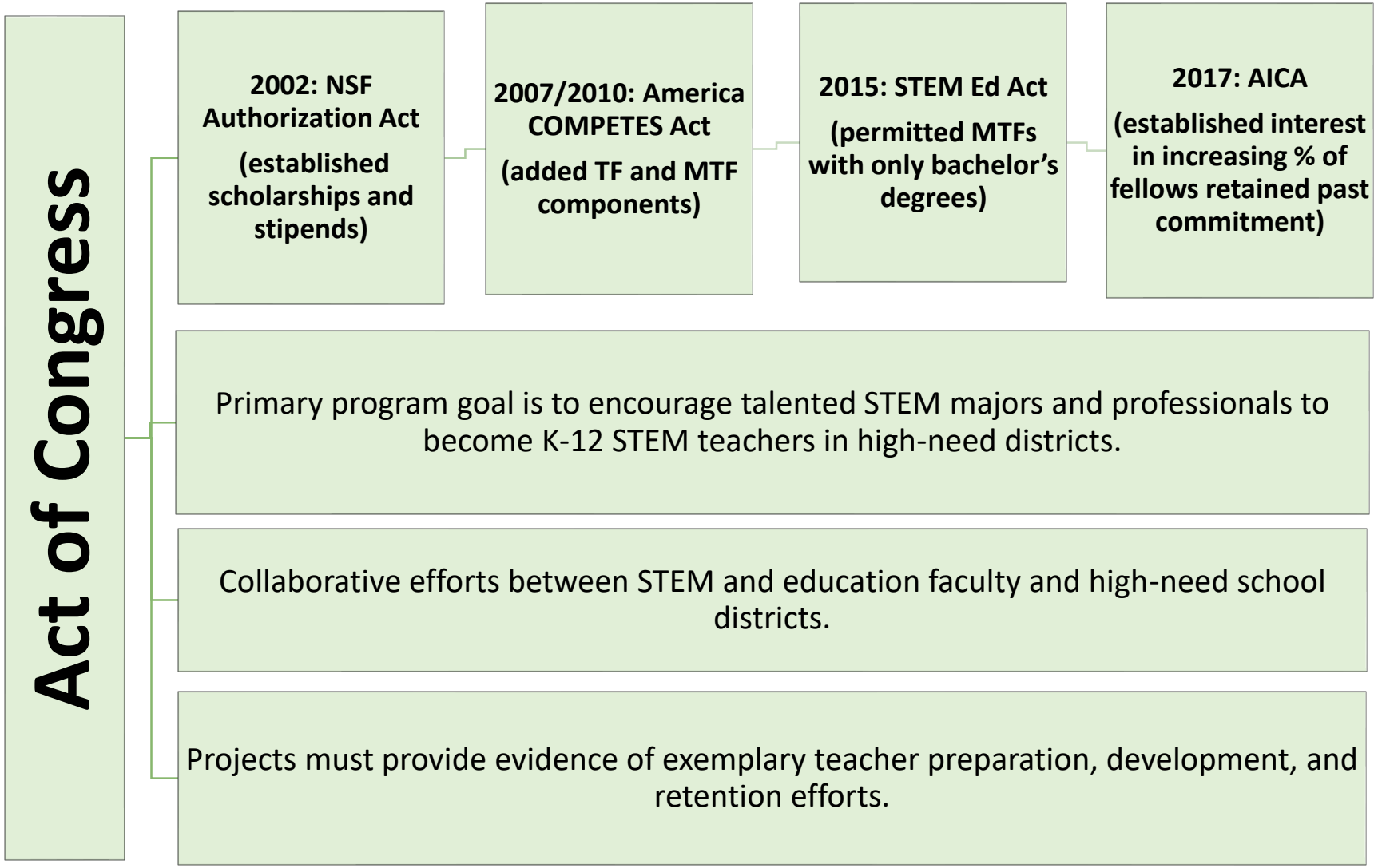
Robert Noyce Teacher Scholarship Program



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Broadening Participation Efforts in Noyce

The Noyce program –

- Focuses on developing, retaining, and diversifying the STEM teacher workforce;
- Develops K – 12 teacher leaders (from diverse backgrounds) in high-need school districts;
- Funds Capacity Building projects;
- Promotes capacity-building strategies for MSIs through funded technical assistance workshops (*Award 1742877 to Quality Education for Minorities Network*);
- Supports working groups to identify a research agenda for K-12 STEM teacher preparation for high-need school districts (*Award 1548986 to AAAS*).

AAAS

ARISE
Advancing Research & Innovation in the STEM Education of Preservice Teachers in High-Need School Districts

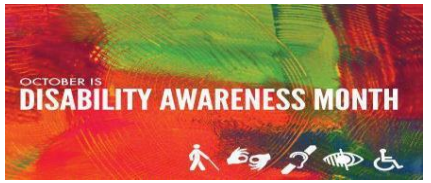
NSF

Grant No. DUE-1548986

Goal

This project, organized by the American Association for the Advancement of Science (AAAS) Education and Human Resources Programs, seeks to provide resources, tools, and a community to foster research and evidence-based innovation in STEM preservice teacher education and leadership development programs for high-need schools.

Upcoming Noyce/AAAS Webinars



Supporting ALL Learners Using Active Learning Pedagogy

October 25 at 3:30pm EDT

Dr. Jose Blackorby, Director of Research and Development at Center for Applied Special Technology

Dr. Jiwon Hwang, Assistant Professor of Special Education at California State University, Bakersfield

Culturally Relevant Pedagogy in the Preparation of Teachers to Work in High-Need Districts

Last week of November

Dr. Etta Hollins, Kauffman Endowed Chair for Urban Teacher Education at University of Missouri-Kansas City

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Broadening Participation Efforts in Noyce

Noyce Partnerships Are Critical

- **High-need School Districts**
- **Non-profit Organizations**
- **STEM University Depts**
- **Industry/Labs**
- **Regional Centers**
- **2-Year Colleges**
- **Education University Depts**
- **Professional Societies**
- **Research Institutes/Agencies**

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Active Awards Example

(*Aligning with NSF BP Efforts*)

Recruiting and Preparing a New Generation of Mathematics, Science, and Computer Science Teachers for High Need Schools (***Award 1758507*** *– associated awards 1439914 and 1035483;* ***PI: Ann Cavallo; University of Texas at Arlington***)

- Track 1 Scholarships & Stipends project
- Partnerships with Tarrant County Community College and Dallas, Arlington, and Ft. Worth ISDs.
- Supports 50 scholars
- Includes ongoing research component that measures Noyce scholars' learning and transition into teaching, including shifts in self-efficacy toward teaching, primary teaching practices, and views of the nature of mathematics and science disciplines
- Potential to lead to a national model for success in STEM teaching in urban settings that will stimulate broadening participation in STEM and promote social justice through mathematics and science teaching and learning

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Active Awards Example

(*Aligning with NSF BP Efforts*)

A Study on Promoting Reflective and Equitable Practice Through Science Teacher Induction (***Award 1540789; PI: Gillian Roehrig; University of Minnesota-Twin Cities***)

- Track 4 Noyce Research project
- Extending existing theories on preparing culturally responsive science teachers and reflective practitioners
- Creating a scientist-teacher partnership induction program in which mutual learning is emphasized between undergraduate Learning Assistants and beginning secondary science teachers
- Studying induction programs as well as construct a set of empirically-based design principles for scientist-teacher partnership induction programs

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Louis Stokes Alliances for Minority Participation: Aiming High and Making a Difference

EHR Advisory Committee Meeting
National Science Foundation
Alexandria, VA

Dr. LeRoy Jones, II
EHR/HRD/LSAMP
19 October 2018

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Louis Stokes Alliances for Minority Participation

- Authorized by Congress in 1991
- Significantly increase the quality and quantity of underrepresented minority (URM) students successfully completing STEM BS degree programs to diversify workforce
- Implement strategies that focus on critical transition points
- Alliances are composed of universities and colleges, government labs, industry and not for profit partners

Targeted Groups & Disciplines

- ✓ Blacks
- ✓ Hispanics
- ✓ American Indians
- ✓ Alaska Natives
- ✓ Pacific Islanders

- ✓ Agricultural Sciences
- ✓ Chemistry
- ✓ Computer Science
- ✓ Engineering
- ✓ Environmental Science
- ✓ Geosciences
- ✓ Life/Biological Sciences
- ✓ Mathematics
- ✓ Physics/Astronomy

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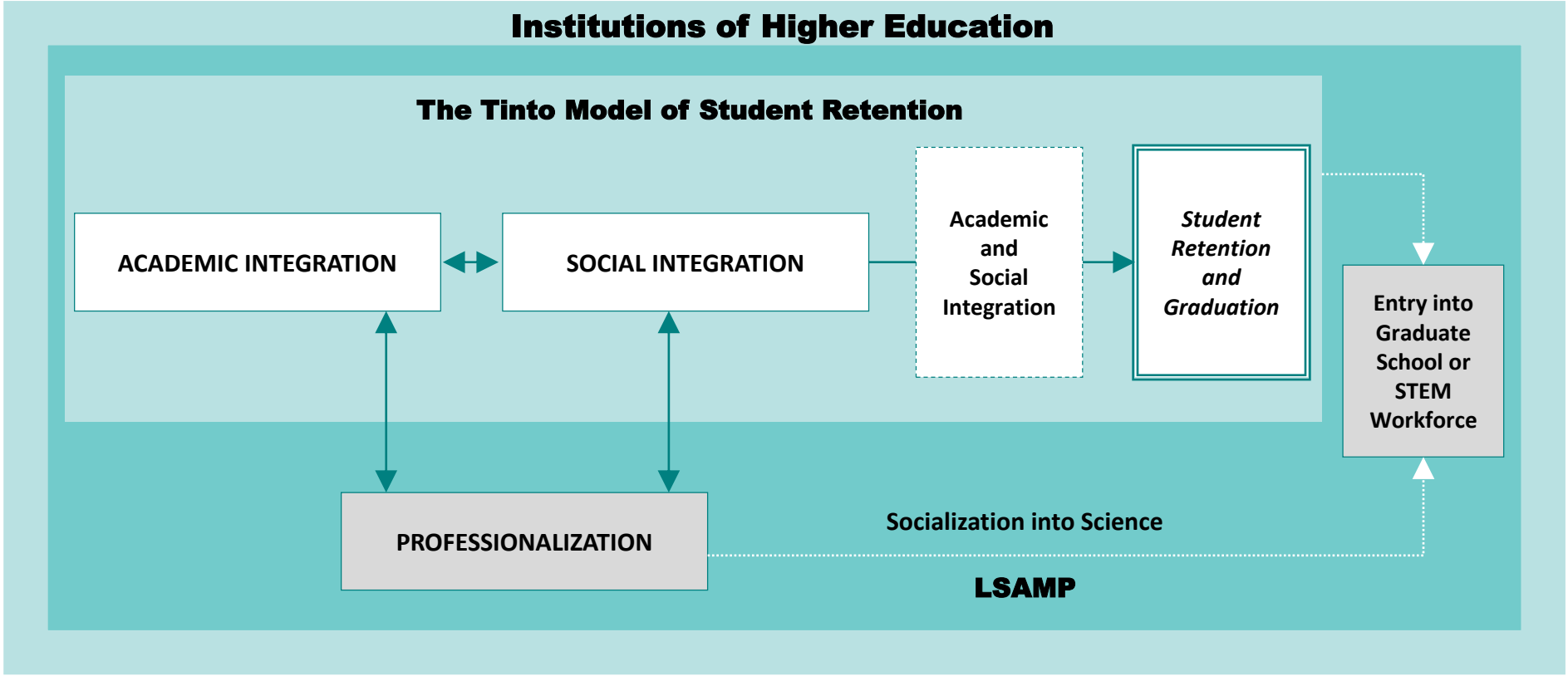
LSAMP Model



- ✓ **ACADEMIC** – Academic performance and faculty/staff interactions
- ✓ **SOCIAL** – Extracurricular activities and peer group interactions
- ✓ **PROFESSIONALIZATION** – Skills, culture and attitudes of STEM discipline

Sources: Adapted from Revitalizing the Nation's Talent Pool in STEM, Washington DC The Urban Institute, 2006

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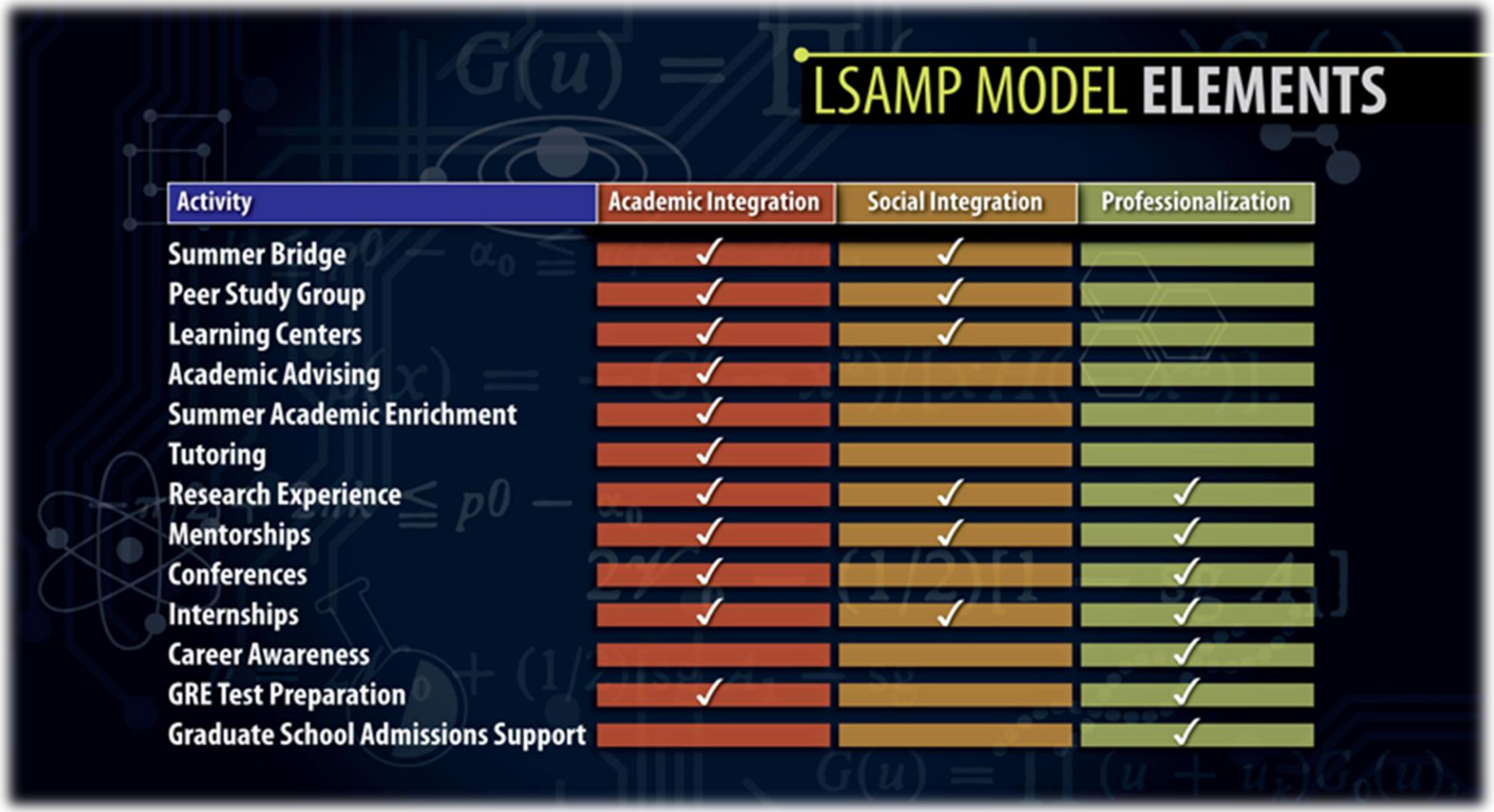

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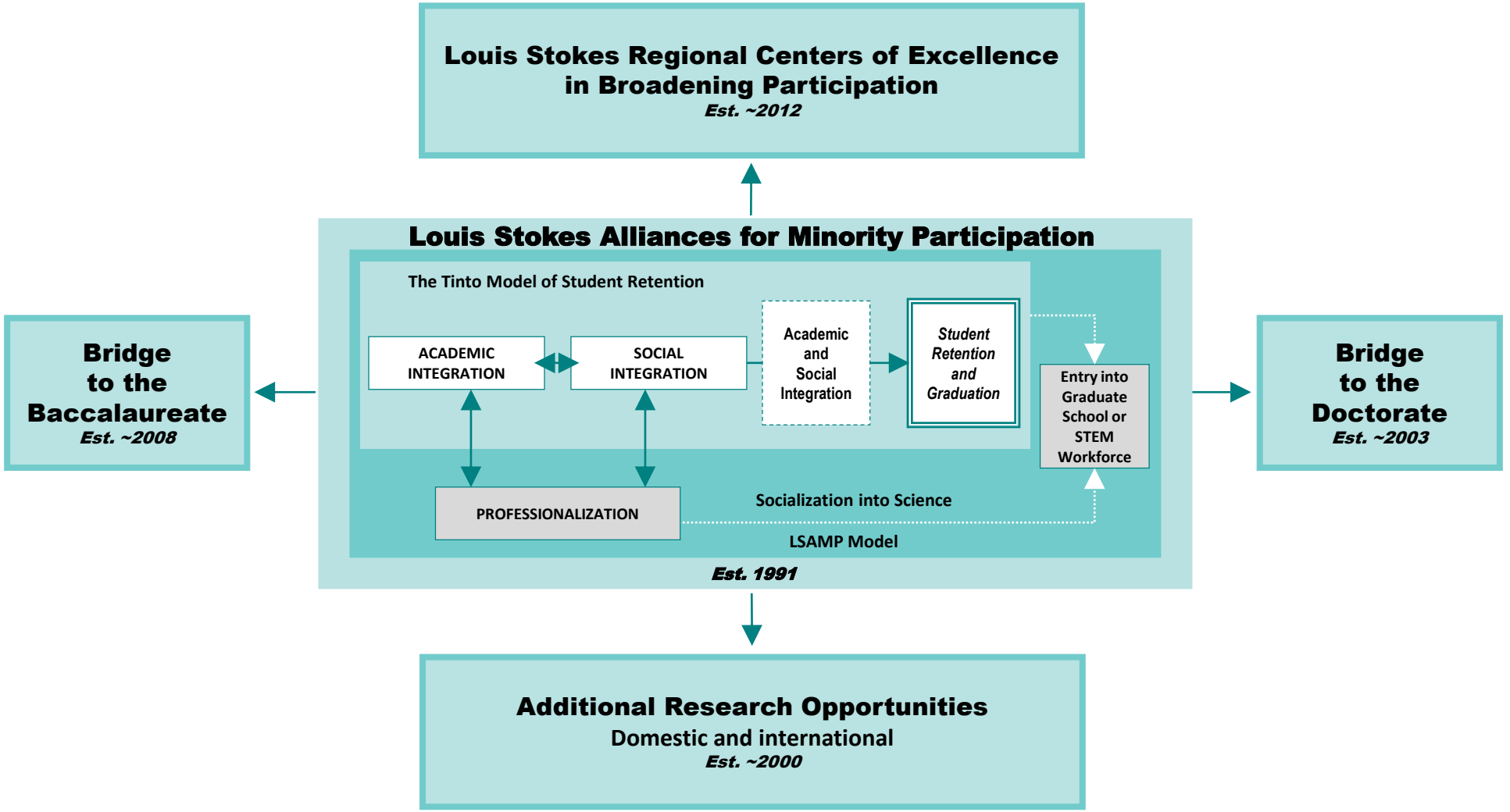
Evolution of the LSAMP Model and Funding Opportunities



Source: What Works! The LSAMP Research Model
Mathematica Policy Research, 2016

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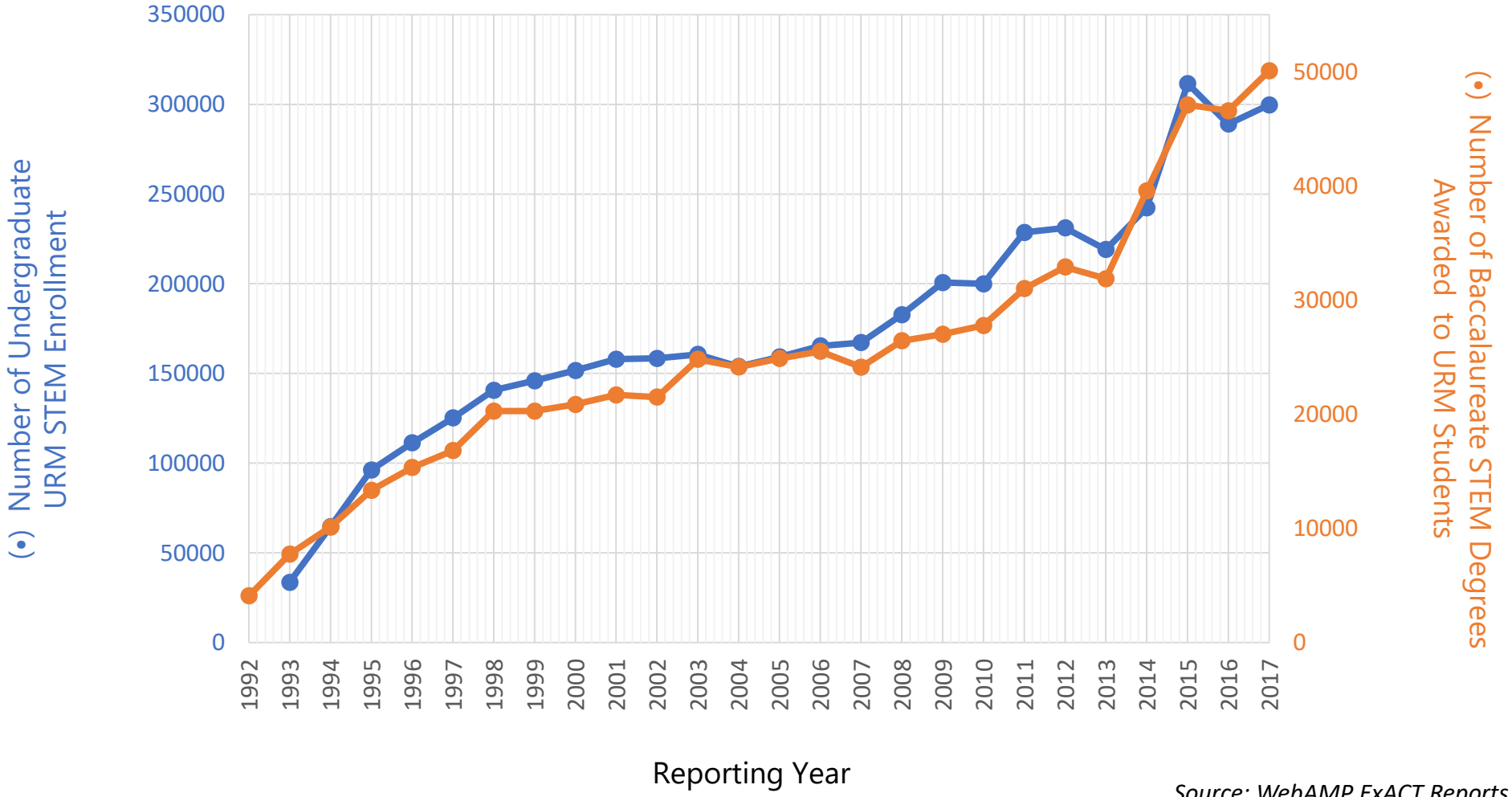
STEM Enrollment and Bachelor's Degrees Awarded to LSAMP Underrepresented Minority Students



Source: WebAMP ExACT Reports
ICF, 2018

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Map of LSAMP-Supported Alliances

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LSAMP – A Program Modeling Group Impact

Booklet Features

- ✓ LSAMP History and Articles
- ✓ Department of Energy Partnership
- ✓ International Research Opportunities
- ✓ Broadening Participation Awards
- ✓ Individual Alliance Impact Highlights
- ✓ Pilot Broadening Participation Center
- ✓ LSAMP Impact Report Viewer Application

NSF HRD Award No. 17-47988

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THANK YOU!!!

LSAMP Team

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Program Director

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Program Director

LeRoy Jones II: ljones@nsf.gov
Program Director

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Taylor Dent-Darden: tdarden@nsf.gov
American Evaluation Association Intern

Chereese Ray: cheray@nsf.gov
Pathways Student Trainee

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Innovative Technology Experiences for Students and Teachers (ITEST)

Program Overview by David Haury

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Aims of the ITEST program

Ensure a high-quality STEM workforce by supporting projects that:

- ✓ Increase student awareness of career opportunities in STEM fields.
- ✓ Motivate students to pursue appropriate educational pathways to STEM-related careers.
- ✓ Provide technology-rich experiences that develop disciplinary knowledge, practices, and non-cognitive skills needed in STEM fields.

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Distinguishing Features of ITEST

- ✓A Broadening Participation Emphasis Program [Solicitation-Specific Review Criteria].
- ✓The Program is supported through revenues generated by applications for H-1B visas.
- ✓Funded projects must engage PreK-12 youth in formal or informal education settings.
- ✓The program promotes engagement with emerging technologies that will likely be encountered in STEM workplaces of the future.

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Three Types of Projects are Supported

Exploratory projects with funding up to $400K for projects lasting up to 2 years.

Strategies projects with funding up to $1.2M for projects lasting up to 3 years.

SPrEaD (**S**uccessful **Pr**oject **E**xpansion **a**nd **D**issemination) projects with funding up to $2M for projects lasting 3-5 years.

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Solicitation Specific Review Criteria

- ✓ Explicit strategies for recruiting and selecting participants from one or more underrepresented populations.
- ✓ Identify the specific needs of the group(s) being served and include specific plans or strategies for addressing them.
- ✓ Planned technology experiences and learning activities are developmentally and age appropriate.

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Priority Areas for Research

1. Student experiences with emerging technologies.
2. Motivation and preparedness to pursue STEM careers.
3. Instructional and curricular innovations.
4. Partnerships with business and industry.
5. Partnerships with communities.
6. Partnerships with school policy leaders.
7. Partnerships with career technical education.

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ITEST Promotes a Broad View of "STEM Workforce"

Attracting and preparing students for the STEM workforce is interpreted broadly as preparing students for STEM careers at all levels, from technicians at middle skills levels to researchers needing advanced academic degrees in STEM fields.

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Example 1: Understanding the Influence of a Teachable Robot on STEM Skills and Attitudes

Award: 1637809, Mount Holyoke College

Middle school geometry students learn new concepts by tutoring a humanoid robot to manipulate its gestures and spoken prompts in response to student utterances and problem-solving actions. The project is examining how the act of tutoring can lead to motivational benefits such as student engagement, positive attitudes toward the subject being studied, and increased confidence.

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Example 2: SportsLab:2020 - Bringing Sport Research and Design Challenges into the 21st Century

Award: 1311901, TERC, Inc.

This project, in partnership with Nike and Vernier Software, is developing and testing a collaborative game-based interactive environment where students, ages 12-18, work with sport researchers in product design teams to create concept models for a sport product design challenge. The project is examining the potential use of design challenges to enhance STEM learning.

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Example 3: Broadening Interest in Geosciences, Habitat, and Technology among Girls

Award: 1513328, University of Alaska Fairbanks

This project examines an out-of-school, place-based, and research-based learning environment on the STEM career interests and identity development of high school girls. In Juneau the program focuses on the life histories and ecosystems of harbor seals, and in Fairbanks the focus is on the life histories and ecosystems of harbor salmon, animals familiar and important to the cultural lives of participants.

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Lunch 11:30 – 12:00PM

Please proceed to the cafeteria around the corner to purchase lunch and return for group discussion.

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EHR Subcommittee Update: STEM Education of the Future

Margret Honey

President & CEO, New York Hall of Science

Chair, EHR AC Subcommittee, Future of STEM Education

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Reflections from the EHR AD

Karen Marrongelle

Assistant Director, EHR

National Science Foundation

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EHR AC Discussion

Facilitator: Julie Johnson

Program Director, Division of Research on Learning in Formal and Informal Settings

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Discussion questions

- Over the last two days, what has surprised you? What would you like to learn more about?

EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez

EHR AC Chair

Chancellor
L.A. Community College District